

**UNESCO-IHE  
INSTITUTE FOR WATER EDUCATION**



**Evaluation of Water Supply Systems in Selected Small  
Towns in Sri Lanka**

**K.P.R.S.Samarasinghe**  
MSc Thesis UWS-2007/10.  
April 2007

**UNESCO-IHE**  
Institute for Water Education



822-Lk07-18962



**Evaluation of Water Supply Systems in Selected Small  
Towns in Sri Lanka**

Master of Science Thesis  
By  
**K.P.R.S.Samarasinghe**

Mentor  
**Saroj Sharma, PhD (UNESCO-IHE)**

Supervisor  
**Prof. Gary Amy, PhD (UNESCO-IHE)**

Examination committee

**Prof. Gary Amy, PhD (UNESCO-IHE), Chairman**  
**Saroj Sharma, PhD (UNESCO-IHE)**  
**Ir.Joep Verhagen, MSc (IRC)**

LIBRARY IRC  
PO Box 93190, 2509 AD THE HAGUE  
Tel.: +31 70 30 689 80  
Fax: +31 70 35 899 64

BARCODE: 10962  
LO: 822 Lk07

This research is done for the partial fulfillment of requirements for Master of Science degree at the  
UNESCO-IHE Institute for Water Education, Delft, the Netherlands

**Delft**

**April 2007**

The findings, interpretations and conclusions expressed in this study do neither necessary reflect the views of the UNESCO-IHE Institution for Water Education, nor of the individual members of the MSc committee, nor of their respective employers.

## Abstract

The Government of Sri Lanka (GOSL) is targeting to ensure access to safe drinking water supply and adequate sanitation to the current population of about 19 million including urban, small towns and rural areas by the year 2015. The ADB assisted third water supply and sanitation project started in the year 1998 is one of the actions to meet above targets. The main components of this project are construction of water supply systems for 1,000 rural villages and 46 small towns with the new approach of community participation which is new to the National Water Supply and Drainage Board (NWSDB). In this approach most of the completed schemes are being managed by community based organizations (CBOs).

As this is a new approach, not much information is available on the sustainability of these water supply systems. Hence, it is important to evaluate some of these small town water supply systems to set plans and to minimize the shortcomings for future and ongoing projects in Sri Lanka.

This MSc study consisted of desk study, field study and data analysis. During the desk study literature review was conducted to understand the general situation, characteristics, and experiences on sustainability issues of small town water supply systems. The study was aimed to review implementation strategy of the project, institutional arrangement, backup support system and sustainability dimensions to give recommendations to ensure sustainability of CBO managed small town water supply systems in Sri Lanka.

For the field study, 4 small town water supply systems were selected from ADB project and 1 water supply system was selected from WB project. In total of 196 persons were interviewed from beneficiaries, CBOs, local authorities, project and NWSDB regional staff to get clear understanding of goal and objectives of the study. Based on the information collected during desk and field studies, strategies were developed to improve the implementation strategy, institutional arrangement, backup support system and O&M of small town water supply systems for sustainability. In order to get better insight, analysis was done based wet vs. dry districts and ADB vs. WB project.

The findings highlighted that all evaluated water supply systems are good in technical and environmental aspects but weak in social, financial and institutional aspects and no significant difference between the water supply systems in wet and dry districts. But wet districts are relatively better than dry districts in all sustainability aspects. It was found that more attention should be given to WB project than ADB project as the WB water supply system scores are lower than the ADB project scores. Steps of selection criteria of small towns, NGOs, water source and treatment methods should be reviewed in project implementation process and present CBO structure should be changed to legal strong body in these water supply systems. Non availability of maintenance fund or loan facilities for CBOs is a dilemma in an emergency and for the development. The analysis also showed that the tripartite agreement should function actively for better continuing support. Water quality monitoring, preventive maintenance, regular meetings within CBO and consumers, publishing and auditing of CBO accounts are the other issues to be resolved to sustain the CBO managed small town water supply systems.



## **Acknowledgements**

This report is the result of the study on “Evaluation of water supply systems in selected small towns in Sri Lanka”. This is the research of my M.Sc. study at UNESCO-IHE, Institute for Water Education, Delft, the Netherlands 2005/2007.

I acknowledge my deepest sense of gratitude to my mentor Dr. Saroj Sharma and Prof. Gary Amy for their excellent advice, patient guidance, outstanding comments and constant support right through this research.

I also wish to thank UNESCO-IHE and its academic and non academic staff especially for the Urban Water and Sanitation Department for the opportunity given me to study in the Netherlands and achieve such a good professional experience that for sure will allow me to serve better my country of Sri Lanka in the water supply sector.

I would like to extend thanks for Mr Wickramage (General Manager), Mr. K.L.L Premanath (Addl. General Manager), Mr. N.I Wikramasinghe (Senior sociologist), Mr.Sarath Wickemaratne (Community development specialist) as well as District Managers in Puttalam, Kalutara and Kegalle and their staff of National Water Supply and Drainage Board for the co-operation to provide the logistic facilities, required data and information for the research activities. I also like to thank beneficiaries, CBOs, local authorities, NGOs and regional manager’s staff of NWSDB relevant to the selected schemes for their co-operation to provide the required data and information.

Furthermore, I would like to deeply acknowledge the Government of Sri Lanka and National Water Supply and Drainage Board for my nomination and providing study leave. I express my sincere gratitude to the ADB project division in NWSDB for financing to my studies in UNESCO-IHE, Delft in the Netherlands.

Lastly, I would like to express my deep appreciation to my family members especially my mother and wife Chandani as well as two children, Praveen and Kasun for their patience and moral support during my studies and long stay in the Netherlands.



## TABLE OF CONTENT

|   |           |
|---|-----------|
| Abstract.....   | i         |
| Acknowledgements .....  | iii       |
| List of tables and figures .....  | ix        |
| Abbreviations .....   | xiv       |
| <br>  |           |
| <b>1.0 INTRODUCTION .....</b>   | <b>1</b>  |
| <b>1.1 Background .....</b>   | <b>1</b>  |
| <b>1.2 Need for research.....</b>   | <b>1</b>  |
| <b>1.3 Goal and objectives.....</b>   | <b>2</b>  |
| <b>2.0 LITRATURE REVIEW.....</b>  | <b>3</b>  |
| <b>2.1 Sri Lanka water sector .....</b>   | <b>3</b>  |
| 2.1.1 <i>Country background.....</i>  | <i>3</i>  |
| 2.1.2 <i>Scio-economic situation.....</i>   | <i>3</i>  |
| 2.1.3 <i>Water supply coverage .....</i>  | <i>3</i>  |
| 2.1.4 <i>Legal and institutional framework .....</i>                                | <i>4</i>  |
| 2.1.5 <i>Main policies in the sector .....</i>                                      | <i>5</i>  |
| <b>2.2 Water supply in small towns in Sri Lanka.....</b>                            | <b>6</b>  |
| 2.2.1 <i>Definition of small towns water supply .....</i>                           | <i>6</i>  |
| 2.2.2 <i>Water supply policies related to small towns and rural areas.....</i>      | <i>6</i>  |
| 2.2.3 <i>Present water supply projects in small towns .....</i>                     | <i>8</i>  |
| <b>2.3 Third ADB water supply and sanitation project .....</b>                      | <b>9</b>  |
| 2.3.1 <i>Project background.....</i>  | <i>9</i>  |
| 2.3.2 <i>Project objectives and targets .....</i>                                   | <i>9</i>  |
| 2.3.3 <i>Project benefits.....</i>  | <i>9</i>  |
| 2.3.4 <i>Implementation arrangement of the project.....</i>                         | <i>10</i> |
| 2.3.5 <i>Actions taken towards sustainability.....</i>                              | <i>10</i> |
| 2.3.6 <i>Institutional arrangement for the O&amp;M.....</i>                         | <i>13</i> |
| 2.3.7 <i>Issues during implementation.....</i>                                      | <i>14</i> |
| <b>2.4 Sustainability of small town water supply systems .....</b>                  | <b>14</b> |
| 2.4.1 <i>Definition for sustainability of small town water supply systems .....</i> | <i>14</i> |
| 2.4.2 <i>Factors effecting for sustainability of water supply system .....</i>      | <i>15</i> |
| 2.4.3 <i>Components of sustainability .....</i>                                     | <i>16</i> |
| 2.4.4 <i>Dimensions of sustainability.....</i>                                      | <i>16</i> |
| 2.4.4.1 <i>Technical sustainability.....</i>  | <i>16</i> |
| 2.4.4.2 <i>Financial sustainability.....</i>  | <i>16</i> |
| 2.4.4.3 <i>Institutional sustainability .....</i>                                   | <i>17</i> |
| 2.4.4.4 <i>Social sustainability.....</i>   | <i>17</i> |
| 2.4.4.5 <i>Environmental sustainability .....</i>                                   | <i>17</i> |
| <b>2.5 Case studies on small town water supply .....</b>                            | <b>18</b> |
| 2.5.1 <i>Small town water supply project in Philippine (ADB, 2006) .....</i>        | <i>18</i> |
| 2.5.2 <i>Water supply sector project in Indonesia (ADB,2002).....</i>               | <i>19</i> |
| <b>3.0 RESEARCH METHODOLOGY.....</b>  | <b>21</b> |
| <b>3.1 Desk study .....</b>   | <b>21</b> |
| 3.1.1 <i>Key issues identified for analysis .....</i>                               | <i>21</i> |
| 3.1.2 <i>Selection of indicators for data collection.....</i>                       | <i>23</i> |
| 3.1.3 <i>Data collection tools.....</i>   | <i>23</i> |
| 3.1.3.1 <i>Design of questionnaires .....</i>                                       | <i>24</i> |
| <b>3.2 Identification of study area.....</b>  | <b>24</b> |
| <b>3.3 Field study .....</b>  | <b>25</b> |
| <b>3.4 Data analysis .....</b>  | <b>26</b> |



|            |  |           |
|------------|--|-----------|
| 3.4.1      | <i>Assessment of operation and maintenance activities towards sustainability</i>                       | 26        |
| 3.4.2      | <i>Assessment of implementation arrangement</i>  | 29        |
| 3.4.3      | <i>Assessment of institutional arrangement</i>   | 29        |
| 3.4.4      | <i>Assessment of backup support system</i>   | 30        |
| <b>4.0</b> | <b>RESULTS AND DISCUSSION</b>  | <b>31</b> |
| <b>4.1</b> | <b>Introduction</b>  | <b>31</b> |
| <b>4.2</b> | <b>Small Town Water Supply systems implemented under the ADB third project</b>                         | <b>31</b> |
| <b>4.3</b> | <b>Analysis of selected water supply systems in dry district</b>                                       | <b>32</b> |
| 4.3.1      | <i>Description of selected water supply systems</i>  | 32        |
| 4.3.2      | <i>Analysis on project implementation</i>  | 33        |
| 4.3.3      | <i>Analysis on institutional arrangement</i>   | 35        |
| 4.3.4      | <i>Analysis on backup support system</i>   | 37        |
| 4.3.5      | <i>Analysis on sustainability dimensions</i>   | 38        |
| <b>4.4</b> | <b>Comparison of two small town water supply systems in dry district</b>                               | <b>41</b> |
| 4.4.1      | <i>Comparison of project implementation</i>  | 41        |
| 4.4.2      | <i>Comparison of institutional arrangement</i>   | 41        |
| 4.4.3      | <i>Comparison of backup support system</i>   | 42        |
| 4.4.4      | <i>Comparison of sustainability dimensions</i>   | 43        |
| <b>4.5</b> | <b>Analysis of selected water supply systems in wet districts</b>                                      | <b>49</b> |
| 4.5.1      | <i>Description selected water supply systems</i>   | 49        |
| 4.5.2      | <i>Analysis on project implementation</i>  | 50        |
| 4.5.3      | <i>Analysis on institutional arrangement</i>   | 52        |
| 4.5.4      | <i>Analysis on backup support system</i>   | 54        |
| 4.5.5      | <i>Analysis on sustainability dimensions</i>   | 55        |
| <b>4.6</b> | <b>Comparison of two small town water supply systems in wet district</b>                               | <b>58</b> |
| 4.6.1      | <i>Comparison of project implementation</i>  | 58        |
| 4.6.2      | <i>Comparison of institutional arrangement</i>   | 59        |
| 4.6.3      | <i>Comparison of backup support system</i>   | 60        |
| 4.6.4      | <i>Comparison of sustainability dimensions</i>   | 60        |
| <b>4.7</b> | <b>Analysis of selected water supply system from World Bank Project</b>                                | <b>67</b> |
| 4.7.1      | <i>Description of selected water supply system</i>   | 67        |
| 4.7.2      | <i>Analysis on project implementation</i>  | 68        |
| 4.7.3      | <i>Analysis on institutional arrangement</i>   | 68        |
| 4.7.4      | <i>Analysis on backup support system</i>   | 69        |
| 4.7.5      | <i>Analysis on sustainability dimensions</i>   | 70        |
| <b>4.8</b> | <b>Comparison of five small town water supply systems in dry and wet districts and from WB project</b> | <b>72</b> |
| 4.8.1      | <i>Comparison of project implementation</i>  | 72        |
| 4.8.2      | <i>Comparison of institutional arrangement</i>   | 73        |
| 4.8.3      | <i>Comparison of backup support system</i>   | 74        |
| 4.8.4      | <i>Comparison of sustainability dimensions</i>   | 76        |
| <b>4.9</b> | <b>Lessons learned and strategies for improvement of small town water supply system in Sri Lanka</b>   | <b>78</b> |
| 4.9.1      | <i>Lessons learned from evaluation</i>   | 78        |
| 4.9.3      | <i>Long-term strategies and responsible institutes to improve the existing situation</i>               | 83        |
| 4.9.4      | <i>Existing and proposed project implementation process</i>  | 86        |
| 4.9.5      | <i>Prerequisites for implementation of suggested strategies</i>  | 88        |
| <b>5.0</b> | <b>CONCLUSIONS AND RECOMMENDATIONS</b>   | <b>89</b> |
| <b>5.1</b> | <b>Conclusions</b>   | <b>89</b> |

|  |            |
|--|------------|
| <b>5.2 Recommendations.....</b>  | <b>91</b>  |
| <b>REFERENCES .....</b>  | <b>93</b>  |
| <b>ANNEX-A: Questionnaires.....</b>  | <b>99</b>  |
| <b>A.1-Questionnaire for household survey .....</b>                                    | <b>99</b>  |
| <b>A.2-Questionnaire for O&amp;M authority .....</b>                                   | <b>103</b> |
| <b>A.3-Questionnaire for NGOs .....</b>  | <b>111</b> |
| <b>A.4-Local authority questionnaire .....</b>   | <b>113</b> |
| <b>A.5-Project Implementation Unit questionnaire .....</b>                             | <b>116</b> |
| <b>A.6-Project Management Unit questionnaire .....</b>                                 | <b>118</b> |
| <b>A.7-NWSDB regional offices questionnaire .....</b>                                  | <b>119</b> |
| <b>ANNEX-B: Criteria for selection of four small town water supply systems.....</b>    | <b>121</b> |
| <b>ANNEX-C: Primary data of all small town water supply systems in six districts..</b> | <b>123</b> |
| <b>ANNEX-D: Primary data analysis of all small town water supply systems .....</b>     | <b>128</b> |
| <b>ANNEX F: Main responsibilities relevant to the operation and maintenance .....</b>  | <b>175</b> |
| <b>activities in MOU signed for backup support system .....</b>                        | <b>175</b> |
| <b>ANNEX G: Photos of five small town water supply systems.....</b>                    | <b>177</b> |



## List of tables and figures

### Tables

|  |    |
|--|----|
| Table 2.1 – Proposed water supply coverage in Sri Lanka .....  | 4  |
| Table 3.1 - Sustainability issues and performance indicators of small town water supply systems .....                                | 23 |
| Table 3.2 - General ranking system for questions.....  | 26 |
| Table 3.3 - Sustainability aspects and relevant criteria for small town water supply systems .....                                   | 27 |
| Table 3.4 - Sustainability aspects and relevant criteria for small town water supply systems .....                                   | 28 |
| Table 3.5 – Criteria for assessment of implementation arrangement of small town water supply systems.....                            | 29 |
| Table 3.6 – Criteria for assessment of institutional arrangement of small town water supply systems.....                             | 30 |
| Table 3.7 – Criteria for assessment of backup support system of small town water supply systems.....                                 | 30 |
| Table 4.1: Number of small towns implemented under the ADB project in each district .....  | 32 |
| Table 4.2(a): Comparison on technical sustainability of two water supply systems in dry district based on household survey.....      | 43 |
| Table 4.2(b): Comparison on technical sustainability of two water supply systems in dry district based on CBO survey .....           | 43 |
| Table 4.3(a): Comparison on institutional sustainability of two water supply systems in dry district based on household survey.....  | 44 |
| Table 4.3(b): Comparison on institutional sustainability of two water supply systems in dry district based on CBO survey.....        | 44 |
| Table 4.4(a): Comparison on social sustainability of two water supply systems in dry district based on household survey .....        | 45 |
| Table 4.4(b): Comparison on social sustainability of two water supply systems in dry district based on CBO survey .....              | 45 |
| Table 4.5(a): Comparison on financial sustainability of two water supply systems in dry district based on household survey.....      | 46 |
| Table 4.5(b): Comparison on financial sustainability of two water supply systems in dry district based on CBO survey .....           | 46 |
| Table 4.6(a): Comparison on environmental sustainability of two water supply systems in dry district based on household survey ..... | 47 |
| Table 4.6(b): Comparison on environmental sustainability of two water supply systems in dry district based on CBO survey.....        | 47 |
| Table 4.7(a): Comparison on technical sustainability of two water supply systems in wet district based on household survey.....      | 60 |
| Table 4.7(b): Comparison on technical sustainability of two water supply systems in wet district based on CBO survey .....           | 61 |
| Table 4.8(a): Comparison on institutional sustainability of two water supply systems in wet district based on household survey ..... | 62 |
| Table 4.8(b): Comparison on institutional sustainability of two water supply systems in wet district based on CBO survey .....       | 62 |
| Table 4.9(a): Comparison on social sustainability of two water supply systems in wet district based on household survey.....         | 63 |

|  |    |
|--|----|
| Table 4.9(b): Comparison on social sustainability of two water supply systems in wet district based on CBO survey .....  | 63 |
| Table 4.10(a): Comparison on financial sustainability of two water supply systems in wet district based on household survey .....                                | 64 |
| Table 4.10(b): Comparison on financial sustainability of two water supply systems in wet district based on CBO survey .....                                      | 64 |
| Table 4.11(a): Comparison on environmental sustainability of two water supply systems in wet district based on household survey .....                            | 65 |
| Table 4.11(b): Comparison on environmental sustainability of two water supply systems in wet district based on CBO survey .....                                  | 65 |
| Table 4.12: Average scores for sustainability dimensions of water supply systems in dry and wet districts (average of households and O&M authorities scores)     | 76 |
| Table 4.13: Average scores for sustainability dimensions of water supply systems in ADB and WB projects (average of households and O&M authorities scores) ..... | 77 |
| Table 4.14(a): Short-term strategies and responsible organizations for project implementation arrangement .....  | 80 |
| Table 4.14(b): Short-term strategies and responsible organizations on institutional arrangement .....  | 81 |
| Table 4.14(c): Short-term strategies and responsible organizations on backup support system .....  | 81 |
| Table 4.14(d): Short-term strategies and responsible organizations on sustainability dimensions .....  | 82 |
| Table 4.15(a): Long-term strategies and responsible organizations for project implementation arrangement .....   | 83 |
| Table 4.15(b): Long-term strategies and responsible organizations on institutional arrangement .....   | 84 |
| Table 4.15(c): Long-term strategies and responsible organizations on backup support system .....   | 84 |
| Table 4.15(d): Long-term strategies and responsible organizations on sustainability dimensions .....   | 84 |

## Figures

|   |    |
|---|----|
| Figure 2.1: Coordination arrangement in ADB Project.....  | 10 |
| Figure 2.2: CBO institutional arrangement in ADB project.....   | 13 |
| Figure 2.3: Backup support system in ADB project.....   | 13 |
| Figure 2.4: Sustainability Chain .....  | 16 |
| Figure 4.1: Map of Sri Lanka with location of project districts .....   | 31 |
| Figure 4.2: Water tower and treatment plant site of Saliyawewa water supply system ..   | 32 |
| Figure 4.3: Pump house and water tower of Kimetiyana water supply system.....   | 33 |
| Figure 4.4: Survey results on project implementation in Saliyawewa water supply system .....  | 34 |
| Figure 4.5: Survey results on project implementation in Kirimetiyan water supply system .....                                       | 35 |
| Figure 4.6: Survey results on institutional arrangement in Saliyawewa water supply system .....                                     | 36 |
| Figure 4.7: Survey results on institutional arrangement in Kirimetiyan water supply system .....                                    | 36 |
| Figure 4.8: Survey results on backup support system in Saliyawewa water supply system .....   | 37 |
| Figure 4.9: Survey results on backup support system Kirimetiyan water supply system .....   | 38 |
| Figure 4.10: Survey results on sustainability dimensions in Saliyawewa water supply system .....                                    | 39 |
| Figure 4.11: Sustainability diamonds as expressed by Households and O&M Authority for Saliyawewa water supply system.....           | 39 |
| Figure 4.12: Survey results on sustainability dimensions in Kirimetiyan water supply system .....                                   | 40 |
| Figure 4.13: Sustainability diamonds as expressed by Households and O&MAuthority for Kirimetiyan water supply system.....           | 40 |
| Figure 4.14: Comparison of two small town water supply systems in dry district on project implementation .....                      | 41 |
| Figure 4.15: Comparison of two small town water supply systems in dry district on institutional arrangement .....                   | 42 |
| Figure 4.16: Comparison of two small town water supply systems in dry district on backup support system .....                       | 42 |
| Figure 4.17: Comparison of two water supply systems in dry district on sustainability dimensions .....                              | 48 |
| Figure 4.18: Sustainability diamonds as expressed by Households and O&M Authority for two water supply system in dry district ..... | 49 |
| Figure 4.19: Intake structure and water source of Kitulgala water supply system.....  | 50 |
| Figure 4.20: Ferro-cement reservoirs and borehole intake of Dedigama water supply system .....                                      | 50 |
| Figure 4.21: Survey results on project implementation in Kitulgala water supply system .....  | 51 |
| Figure 4.22: Survey results on project implementation in Dedigama water supply system .....   | 52 |
| Figure 4.23: Survey results on institutional arrangement in Kitulgala water supply system .....                                     | 53 |
| Figure 4.24 Survey results on institutional arrangement in Dedigama water supply system .....                                       | 53 |
| Figure 4.25: Survey results backup support system in Kitulgala water supply system..  | 54 |

|   |    |
|---|----|
| Figure 4.26: Survey results on backup support system Dedigama water supply system   | 55 |
| Figure 4.27: Survey results on sustainability dimensions in Kitulgala water supply system   | 56 |
| Figure 4.28: Sustainability diamonds as expressed by Household and O&M Authority for Kitulgala water supply system                                      | 57 |
| Figure 4.29: Survey results on sustainability dimensions in Dedigama water supply system  | 57 |
| Figure 4.30: Sustainability diamonds as expressed by Household and &M Authority for Dedigama water supply system  | 58 |
| Figure 4.31: Comparison of two small town water supply systems in wet district on project implementation  | 59 |
| Figure 4.32: Comparison of two small town water supply systems in wet district on institutional arrangement   | 59 |
| Figure 4.33: Comparison of two small town water supply systems in wet district on backup support system   | 60 |
| Figure 4.34: Comparison of two small town water supply systems in wet district on sustainability dimensions   | 66 |
| Figure 4.35: Sustainability diamonds as expressed by Household and O&M Authority for two water supply systems in wet district                           | 66 |
| Figure 4.36: Water tower and intake well of Kuruwita water supply system  | 67 |
| Figure 4.37: Survey results on project implementation in Kuruwita water supply system   | 68 |
| Figure 4.38: Survey results on institutional arrangement in Kuruwita water supply system  | 69 |
| Figure 4.39: Survey results backup support system in Kuruwita water supply system   | 70 |
| Figure 4.40: Survey results on sustainability dimensions in Kuruwita water supply system  | 71 |
| Figure 4.41: Sustainability diamonds as expressed by Household and O&M Authority for Kuruwita water supply system                                       | 71 |
| Figure 4.42 shows the comparison of the average scores of small town water supply systems in wet and dry districts on project implementation activities | 72 |
| Figure 4.43: Comparison of small town water supply systems in ADB and WB projects on project implementation   | 73 |
| Figure 4.44: Comparison of small town water supply Systems in wet and dry districts on institutional arrangement  | 73 |
| Figure 4.45: Comparison of small town water supply systems in ADB and WB projects on institutional arrangement  | 74 |
| Figure 4.47: Comparison of small town water supply systems in ADB and WB projects on backup support system  | 75 |
| Figure 4.48: Sustainability diamonds as expressed as Households and O&M Authority (averages for water supply systems in dry and wet districts)          | 76 |
| Figure 4.49: Sustainability diamonds as expressed as Households and O&M Authority (averages for water supply systems in ADB and WB projects)            | 77 |
| Figure 4.50: Existing project implementation process in ADB project   | 86 |
| Figure 4.51: Proposed implementation process for future projects  | 87 |





**Abbreviations**

|        |  |
|--------|--|
| ADB    | Asian Development Bank                                     |
| CBO    | Community Based Organization                               |
| CWSSP  | Community Water Supply and Sanitation Projects             |
| DCC    | District Level Coordination Committee                      |
| DIU    | Divisional Implementation Unit                             |
| DS     | Divisional Secretary                                       |
| GDP    | Gross Domestic Product                                     |
| GOSL   | Government of Sri Lanka                                    |
| GROW   | Grassroots Woman Participation Project                     |
| LA     | Local Authorities  |
| LWUA   | Local Water Utilities Administration                       |
| NGO    | Non Governmental Organizations                             |
| NSC    | National Level Steering Committee                          |
| MOU    | Memorandum of Understanding                                |
| NWSDB  | National Water Supply and Drainage Board                   |
| MIZ    | Metropolitan Influence Zone                                |
| MUDWS  | Ministry of Urban Development and Water Supply             |
| O & M  | Operations and Maintenance                                 |
| PCI    | Planning Commission India                                  |
| PHAC   | Public Health Agency of Canada                             |
| PIU    | Project Implementation Unit                                |
| PMU    | Project Management Unit                                    |
| PS     | Pradeshiya Sabha   |
| RST    | Rural and small town                                       |
| RWS    | Rural Water Supply   |
| RWSS   | Rural Water Supply and Sanitation                          |
| TWSSP  | Third Water Supply and Sanitation Project                  |
| UNDP   | United Nations Development Program                         |
| UNESCO | United Nations Education, Social and Cultural Organization |
| WB     | World Bank   |



## **1.0 INTRODUCTION**

### **1.1 Background**

Half of the world population is expected to live in urban areas by 2007. The increased population expected from year 2000-2030 will be settled in urban areas, periurban areas and small towns. Ninety percent of increase will occur in less developed countries by the year 2025. More than one billion people are still living without access to safe water the world. Most of them are living in urban poor areas, periurban areas, and small towns in Asia, Africa and Latin America (Sharma, 2006).

The Millennium Development Goals were set up in year 2000 September to halve by the year 2015, the proportion of people without sustainable access to adequate and affordable safe drinking water and by the year 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers (United Nations, 2000).

The Government of Sri Lanka (GOSL) is targeting to ensure access to safe drinking water supply and adequate sanitation to the current population of about 19 million by the year 2015. The main strategy of GOSL is to achieve this goal of the National Policy for Rural Water Supply and Sanitation (RWSS Policy) approved by the Cabinet in March 2001. The policy clearly stated that the sector targets, and main roles and responsibilities of all sector institutions (World Bank, 2003).

Sri Lanka has approximately 4500 km of rivers, 2400 km of irrigation canals and 3500 deep-water tanks, reservoirs, and artificial and natural wetlands. But main water sector issues are inadequate access to water and sanitation services to peoples especially in small towns and rural areas. Most of rural and small town populations obtain water from dug wells rivers, streams and springs (UNDP, 2004).

In the view of above, the GOSL has taken a step towards starting water supply and sanitation projects with the assistance of World Bank and Asian Development Bank (ADB). Those projects mainly target on rural and small town population. There were two major projects started with the assistance of World Bank to cover about 75 of small towns in late nineties and early 2000 are called Community Water Supply and Sanitation projects (CWSSP) and the other major project started with the assistance of ADB to cover 46 small towns. The National Water Supply and Drainage Board (NWSDB) already covered about 100 of small towns water supply facilities remaining towns to be covered (MUDWS, 2005 a)

The ADB assisted project called "Third Water Supply and Sanitation Project" was implemented in the year 1998 and completed in 2006. The main components of the project are construction of Anuradapura group town, construction of six urban schemes, construction of water supply schemes for 1,000 rural villages and 47 small towns, construction of 87,000 latrine units and institutional development (ADB, 1997).

### **1.2 Need for research**

There are forty-six small town water supply schemes that have been completed in the year 2006 in three stages by the above-mentioned ADB Third Water Supply and Sanitation Project with community participation approach. This is a new approach to the NWSDB because this is the largest project implemented with the community

participation. Most of the completed schemes are being managed by community organizations and local authorities manage some of them. The very small number of remaining small towns are being managed by NWSDB.

The ADB project has paid attention to the sustainability of the project from the beginning and it has taken several steps to achieve this target. Those steps are

- ✓ Decision making with communities at planning, implementation and O&M.
- ✓ Involvement of NGOs at different stages in project implementation.
- ✓ Training and capacity building on financial and technical aspects of all partners, such as, community organizations, NGOs, Local authorities etc.
- ✓ Establishment of better institutional arrangement for O&M.

Community-based approach has been implemented in Sri Lanka mainly in rural water supply systems. However using this approach in small town water supply systems is relatively new in Sri Lanka. As this is a new approach, not much information is available on the sustainability of these small town water supply projects. An insight into the various aspects of implementation of these projects would help in setting plans for future water supply and sanitation projects in Sri Lanka. It will also help to minimize the shortcomings in ongoing projects.

Therefore, it is very relevant and important to evaluate some small town water supply systems to assess the operation and maintenance activities of relevant operation and maintenance authorities and to review the implementation strategy and institutional arrangement established for the management of water supply schemes.

### 1.3 Goal and objectives

The main goal of this study is to develop strategies to improve the implementation and operation and maintenance activities of small town water supply systems towards sustainability, especially managed by community based organizations (CBOs).

The specific objectives of this study to achieve the above-mentioned goal are

1. To evaluate the small town component of the ADB project by selecting number of small towns from wet and dry districts out of six districts
2. To review institutional arrangement established for the sustainability of water supply systems and propose recommendations to improve the coordination arrangement among all stakeholders.
3. To review the implementation strategy of the project for the use of future projects, specially suitable to the Sri Lankan situation.
4. To suggest measures to be taken to improve the back up support system ensure sustainability of small town water supply systems

## 2.0 LITRATURE REVIEW

### 2.1 Sri Lanka water sector

#### 2.1.1 Country background

Sri Lanka is a small island, situated in southern part of the south Asian region. Its land area is 65,610 square kilometers (25,332 square miles). The present population is about 19 million and population growth rate is about 1.22 percent. Nearly 30% live in urban areas and about 70% of the population are engaged in agriculture and live in rural areas (GROW, 2004).

Sri Lanka is in a tropical region and temperature varies from 12<sup>0</sup>C to 32<sup>0</sup>C according to the altitude. Average temperature is 27<sup>0</sup>C and average annual rainfall island wide is 1,836 mm, while the lowest is 1,250 mm and the highest is 5,080 mm (Metrological Department of Sri Lanka, 2005). Sri Lanka has two monsoons; those are namely as Southwest monsoon and the Northeast monsoon. Southwest monsoon brings rain mainly from May to August to the western, southern and central parts of the island and the northeast monsoon rains occur in the northern and eastern parts of the country during November to February.

#### 2.1.2 Scio-economic situation

According to the Central Bank of Sri Lanka, the GDP growth rate is 5.6 % in year 2005 and GDP per capita is \$ 1200. The agriculture sector contributes 38 %, industrial sector contributes 17 % and the major contribution of 45% done by the services sector to the GDP growth rate. The inflation rate was 5.8% (in year 2004) and 22 % of population are below poverty line. The total labor force is about is 7.6 million out of total population of 20 million. The unemployment is 8.0 %.

The main industries prevailing in Sri Lanka are tea, rubber, coconut and other agricultural commodities. The other major industries are telecommunication, insurance, banking, clothing, cement, petroleum refining, textiles, and tobacco.

#### 2.1.3 Water supply coverage

In the year 2003, about 4.8 million people (28.6 % of the population) are provided with piped water and 1.4 million (8 %) are provided with tube-well water. In addition, 27 per cent of the rural and small town population obtains safe drinking water from dug wells. Accordingly, 90 % of the urban population and 57 % of the rural and small town population are provided with safe drinking water facilities (NWSDB, 2005).

The National Water supply and Drainage Board (NWSDB) is the major organization to supply piped born water in Sri Lanka. It is presently operating 287 water supply schemes, which cover 28.6% of the total population with piped water Supply. The target of the NWSDB is to increase the coverage with piped water to 40% by 2015 within Sri Lanka. Therefore the United Nations Millennium Development Goal of

85% safe drinking water coverage can be achieved by the year 2015 with all the other institutions with several options such as rainwater harvesting, hand pump tube wells, developed point sources etc.

**Table 2.1 – Proposed water supply coverage in Sri Lanka**

| As % to total population            | 2003 | 2004 | 2005 | 2006  | 2007 | 2015  |
|-------------------------------------|------|------|------|-------|------|-------|
| <b>By NWSDB</b>                     | 29%  | 31%  | 34%  | 37%   | 39%  | 40%   |
| <b>By ADB Projects</b>              | 2%   | 2%   | 2%   | 2.6%  | 3%   | 2.5%  |
| <b>By Other Agencies</b>            | 44%  | 44%  | 43%  | 42%   | 41%  | 40.5% |
| <b>Overall access to safe water</b> | 75%  | 77%  | 79%  | 81.6% | 83%  | 85%   |

*Source: NWSDB (2005)*

As a main piped water provider of Sri Lanka, the National Water Supply and Drainage Board has taken several measures to increase the present supply capacity in Colombo City and other urban areas such as Kandy, Matar, Galle main towns by increasing capacities of treatment plants, replacing old asbestos cement pipes, laying of new pipe lines in small towns, peri-urban areas and suburbs by utilizing foreign and local funds.

#### *2.1.4 Legal and institutional framework*

##### **National level**

National Water Supply and Drainage Board, Water Resources Board, Irrigation Department, Sri Lanka Mahaweli Authority, and Water Secretariat are the national level institutions in Sri Lanka for water related activities.

The National Water Supply and drainage Board is responsible for implementation and operation and maintenance of piped water supply system all over the country especially in urban areas. It has highly technically qualified personals in water supply field including all specialists for design, construction and operation and maintenance of piped water supply systems and the other multidisciplinary groups such as sociologists, accountants etc.

The Irrigation Department is mainly responsible for supply water to irrigation works, maintaining main irrigation tanks, monitoring of river flows etc.

The Water Resource Board is mainly responsible for ground water monitoring and drilling works.

Water Secretariat is the institute making policies on water sharing issues.

Sri Lanka Mahaweli Authority is the institute carries out activities on supply of water for irrigation and other purposes in newly settled area within the Mahaweli river basin.

##### **Regional level**

Local authorities are the main institute for responsible for drinking water supply at regional level. There are three levels of local authorities in Sri Lanka namely, Municipal Councils, Urban Councils and Pradeshiya Sabhas. But National Water Supply and Drainage board, because of the legal power obtained from their act,

covers the most of drinking water supply municipal and urban areas. But at lowest level of the local authority they have their own water supply systems in small towns and rural areas. Those are managed poorly due to various management and technical problems.

### **Local Level**

In some areas in Sri Lanka, water supply schemes are under the management of community organizations. Those are mainly in rural areas and in some small towns. The community management schemes began after the project implemented under the World Bank called community water supply and sanitation project in 1993. The main problems of these schemes are reliability of water source in dry period and lack of backup support system to help them especially in technical issues.

#### *2.1.5 Main policies in the sector*

### **National Water Resources Policy**

The existing legislation is not adequate to resolve the current water issues in Sri Lanka. The legal provisions are scattered through various organizations such as Irrigation Department, National Water Supply and Drainage Board, Water Resources Board, Central Environmental Authority, Sri Lanka Mahaweli Authority Local authorities etc. There is no single responsible institute to regulate allocation, protection and conservation of water resources in Sri Lanka. Therefore the Government of Sri Lanka has decided to introduce a National Water Resources Policy to regulate water allocations. It is under preparation (Bandara, 2005).

The proposed policy is based on following principles

- ✓ Water is basic need of all living beings.
- ✓ Need to assure safe water for present and future generation as a fundamental right all citizens.
- ✓ Water is limited and invaluable resource.
- ✓ Priority is given to domestic needs when allocating water from existing resources and developing and managing of new resources.
- ✓ River basins, sub basins and connected basins will be the hydrological units for planning and management of water resources.
- ✓ Water rights will be recognized with regulations and governing allocations in line with national priorities.
- ✓ Relevant authorities will monitor ground water extraction including ground water sensitive areas.
- ✓ Management of water resources will be developed or decentralized as provided in the constitution.
- ✓ All developers including state agencies will need to obtain the approval of National Water Resources Authority for development of water resources.

- ✓ The state will promote the integration of gender concern in policies, plans and programs in water sector activities.

## 2.2 Water supply in small towns in Sri Lanka

### 2.2.1 Definition of small towns water supply

Definition of “Small Town Water Supply” is different from country to country, even from place to place in a large country. But in many countries small towns are most rapidly growing centers of population growth and expanding commercial activities.

According to the Public Health Agency in Canada small towns are as follows.

**“Rural and small town (RST):** individuals living in towns or municipalities outside the commuting zone of larger urban centers (population of 10,000 or more). These individuals may be disaggregated into 4 sub-groups based on the size of the commuting flow and the degree of influence of a larger urban center (called metropolitan influence zone [MIZ]”.

In terms of water supply, small towns can be characterized as:

“Settlement that is sufficiently large and dense to benefit from the economics of scale offered by piped systems, but too small and dispersed to be efficiently managed by a conversional urban water utility. Small towns usually have population between 5,000 and 50,000 but can be larger or smaller depending on the local situation” (Sharma, 2006).

For a good definition for small town, the number of people living in an area cannot be considered as the only criteria. The other criteria like availability of infrastructure facilities, population density, and location of the town center should also be considered.

### 2.2.2 Water supply policies related to small towns and rural areas

#### The Rural Water Supply Policy

The Government of Sri Lanka is aware of the importance of health and well being of its people for social and economic development and has set a goal of providing access

to safe drinking water and basic sanitation to all citizens by the year 2015. The policy for the rural water supply and sanitation sector has recognized the value of water, and the need for institutional arrangement for the efficient management of facilities with community participation and the stakeholders (MUDWS, 2005 b)

Basic principle of the RWS policy can be listed as follows:

- ✓ Fresh water is a finite and vulnerable resource essential to sustain life and ecosystems.
- ✓ Water has an economic value and should therefore be recognized as an economic good
- ✓ Decision making and active participation by users including women and other disadvantaged groups



- ✓ Minimum user contribution toward capital investments and cost recovery of operations
- ✓ Involvement of all stakeholders (Govt. agencies at all levels, Non-govt. organizations, and private sector) with government acting as a Facilitator
- ✓ Water source protection and improvement (Integrated Approach).
- ✓ Provision of water supply and sanitation together with hygiene education
- ✓ Sector activities should be based on participatory approach involving users, planners and policy makers at all levels.
- ✓ Users should be encouraged to own and manage the facilities and assets.
- ✓ Users should be responsible for the sustainable operation and maintenance of the facilities.
- ✓ All sector activities should be in harmony with the environment

### National Rainwater Policy in Sri Lanka

The Sri Lanka is on the high side of annual renewable quantity of water with comparison to other countries in the world. The rainfall volume being 5900 m<sup>3</sup>/capita but, annual volume flowing to sea about 1400 m<sup>3</sup>/capita based on the population. But according to the planners in Sri Lanka the supply of adequate water to the people living in urban, small towns and rural areas is a major issue. The soil degradation, not sufficient water to flora and fauna and all the other living forms also issues due to improper management of this rainwater source. Therefore the GOSL decided to introduce a National Rainwater Policy to get the maximum benefit of this valuable resource effectively (MUDWS, 2005 c).

The policy objective is to minimize the investment and operational maintenance costs in fields of pipe born water supply, drainage, flood contrail soil conservation etc. The policy statement strongly mentioned that rainwater harvesting should be made mandatory under the Municipal, Urban and Pradeshiya Sabha (lowest level of local authority in Sri Lanka) areas within prescribed time period (MUDWS, 2005b ).The important desired benefits form this policy as follows:

- ✓ Minimize usage of portable pipe born water for secondary usage.
- ✓ Manage demand for water and rationalized new investment.
- ✓ Reduce storm water runoff and urban flooding.
- ✓ Prevent depletion of ground water.
- ✓ Save national energy and water losses.
- ✓ Assist to meet the millennium development in water and sanitation
- ✓ Improve the access of water to marginalized communities

The above two policies are very important to implement small town projects in Sri Lanka. Because, Sri Lanka is a developing country and it has not enough funds and

resources to construct highly sophisticated facilities, which managed by government or local authorities or large companies. Therefore it is important to consider the decentralized systems towards sustainable development in water sector also.

The rural water policy is applicable to small town areas as well as rural areas. It has very attractive features for the implementation of decentralized water supply systems. Decision-making and active participation by users including women and other disadvantaged groups, users should be encouraged to own and manage the facilities / assets and users should be responsible for the sustainable operation and maintenance of the facilities are key factors for the sustainability of decentralized water supply system. The minimum user contribution toward capital investments and cost recovery of operations is the other important factor to initiate the sense of ownership among users. It is necessary because, users will not depend on others and they will take care of the water system by contributing to the construction and operation and maintenance of the system.

The rainwater policy is also applicable to small town areas as well as rural, because rainfall in Sri Lanka varies from around 1000 to 6000mm. Water supply issues in dry areas mainly depend on the rain in Sri Lanka. Therefore it is important to manage the rainwater usage in scientific manner. The rainwater policy introduces an important and key factor to manage the rainwater harvesting. In addition to that, it shows benefits, which can be achieved by applying the policy in urban, small towns and rural areas. Most of these benefits are important to developing countries like Sri Lanka.

### *2.2.3 Present water supply projects in small towns*

There are two major projects are presently implementing in Sri Lanka to fulfill the requirement of water supply facilities in small towns with the assistance of the World Bank and the Asian Development Bank. The two projects called Community Water Supply and Sanitation Project (CWSSP) and the Third Water Supply and Sanitation Project (TWSSP) respectively. Ministry of Urban development and water supply in Sri Lanka is responsible for both project, but the CWSSP is implementing by separate project unit and the TWSSP is implementing by the NWSDB. These two projects mainly based on community participation and strictly follow the Rural water Policy of Sri Lanka.

#### The Community Water Supply and Sanitation Project

First phase of this project were implemented in year 1993 and it was successfully completed in the year 1998. This is the first water supply and sanitation project started in Sri Lanka with the community participation. The Second Community Water Supply and Sanitation Project is presently in operation and it will support the Government of Sri Lanka's Rural Water Supply and Sanitation (RWSS) Program, focusing on North East, North West and Central Provincial Councils. The project development objective is to increase service coverage and achieve effective and sustained use of water and sanitation services in rural and small town communities. The project will also strengthen local governance by empowering local communities to plan, implement and manage their own water and sanitation investments. (World Bank, 2003)

The project components are:

- ✓ Physical investments for service improvements of small towns and rural areas in North East, North West and Central Provincial Councils.

- ✓ Implementation support will finance organizations to provide assistance for communities
- ✓ Program management and capacity building
- ✓ Financing for rural water supply and sanitation schemes in the North Provincial Council.

### Third Water Supply and Sanitation Project

This one of the major project was implemented by government of Sri Lanka through NWSDB to achieve safe drinking water and sanitation targets throughout the country. Details of the project explained in the next section.

## **2.3 Third ADB water supply and sanitation project**

### *2.3.1 Project background*

Providing of safe drinking water and sanitation facilities to people in urban, small towns and rural areas of Sri Lanka is one of the most critical challenges faced by Sri Lanka government. Because the government allocation for providing safe drinking water and sanitation facilities from annual budget is only about 5 percent in this period. Therefore the government of Sri Lanka decided to take funds from international agencies to solve the problem as soon as possible. It is one of the results of the ADB Third Water Supply and Sanitation Project (ADB, 1997).

### *2.3.2 Project objectives and targets*

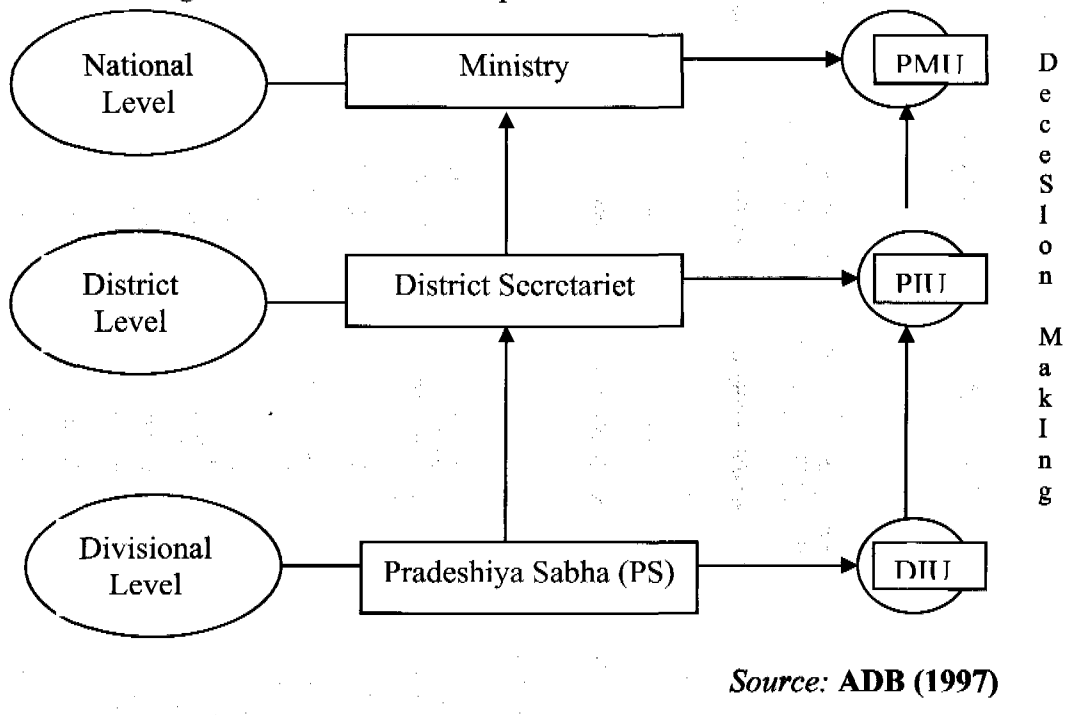
According to the recommendation report on loan of ADB board of directors, the main aim of the project is to ensure the long-term sustainability of the water sector development in Sri Lanka through policy reforms and also to improve the health and well being of one million people in the six districts through improvement in the water supply and in sanitation and education in hygiene (ADB, 1997).

### *2.3.3 Project benefits*

The project planed to improve the water supply and sanitation facilities in urban, small towns and rural areas in six districts of the country and it was constructed new water supply schemes to cater about 80,000 households and new tube wells and dug wells for about 100,000 households. Therefore it covered about 46 small towns and 1000 rural villages including individual household sanitation facilities .In all, about one million people were benefited (ADB board, 1997).

### 2.3.4 Implementation arrangement of the project

The project implement agency is NWSDB of Sri Lanka. A Project Management Unit (PMU) established at the NWSDB head quarters at Colombo to provide management and policy supports to Project Implementation Units (PIU) at selected six districts. The coordination arrangement with all the other stakeholders of the project is done through series of coordination committees. Secretary to the ministry chaired the National level steering committee (NSC) at the ministry of Urban Development and Water Supply. The next level of coordination committee is District level coordination committee (DCC) and it was established at District secretariat in each district. The chairperson of the DCC is District Secretary. The other committee is Divisional Level Coordination committee (DLCC), which was established at lowest level of local authority, is called "Pradeshiya Sabha (PS)" and two chairpersons of Divisional Secretary (DS) and Chairman of PS were chaired. The implementations of the project were done through the Community Based Organizations (CBO), Non governmental Organizations (NGO) as Partner Organizations and with the private sector.



Source: ADB (1997)

**Figure 2.1: Coordination arrangement in ADB Project**

### 2.3.5 Actions taken towards sustainability

#### Feasibility study

After the selection of small towns, the project studied and prepared a brief feasibility report on technical aspects for each small town to get a rough idea to partner organizations to carryout the project activities. These reports include the ground water availability of the area, available water sources, distance from water source to town, rough town plan, land availability for reservoirs and other structures, availability of town development plans, etc.

### Involvement of NGOs in Implementation as Partners

The project implemented with a community participation concept. But NWSDB is having very low experience in community participation because, it is a highly technical oriented organization and this the first project launch with community participation. Therefore NGO involvement is an essential for the successful implementation of project for sustainability of the constructed facilities. Hence, experienced NGOs were selected to employ at all stages as partner organizations. One selected NGO was appointed to each and every small town and there were around five people including one project manager, three-community facilitators and one technical officer for each small town. The size of the team is depending on the size of the small town.

### Formation of Community Based Organizations (CBO)

The key roll of the NGO is to form a CBO or identification of active CBO within the selected small town area. The main idea behind this is to get an active involvement of user community for the project activities in planning, construction and operation & maintenance of water supply system. During the formation of CBO within the area, the NGO was held series of meetings in street level and explain them to project policies and then selected representatives from the small group to represent the main meeting. After having number of small group meetings, all of the representatives were call to one public place and select the office bearers (executive committee) for the CBO. Then the executive committee of the CBO was engaged at all stages of decision making process in project cycle.

### Participatory approach

Participatory approach is an important for the sustainability in water supply projects. Therefore at every stage in the project, all users were consulted through series of community meetings. All the meetings were arranged by partner organizations at street levels during planning, construction and pre operation and maintenance phases. Women participation is specially focused in these meetings because; it is necessary get there ideas in all aspects of water supply for sustainability of projects.

### Selection of options

Selection of options for water supply facilities was done in planning phase and options were based on information gathered through community meetings and on the brief feasibility report prepared at the beginning of the project. During the selection of options, it was considered all the feasible technical options for sources, such as deep wells, shallow wells, rainwater systems, streams, rivers etc. Options are well prepared before present to the community and it includes rough costs for structures, pipelines, land values, operation and maintenance etc. Capital cost, community contribution and government contribution also shown for each and every option.

### Community Agreement for options and O & M

Prepared options were present in street level community meetings to get the ideas, suggestions and concurrence for selected option from the user community. During street level meetings, options were clearly explained by team members of partner organization and project officers on all the technical, operations and maintenance and other aspects.

After a series of street level meetings, the selected option presented to the community Based Organization's (CBO) general meeting. The CBO were formed among the members of street level small groups. Selection of operation and maintenance authority also finalized in this meeting in addition to the getting of consent for final option.

### Community Contribution (Labor/Cash)

Community contribution is giving considerable weight to the sustainability of the project. Because after contributing to the project, the user feels ownership of facilities. This feeling is creating to take care of their facility and not allow to others to misuse it. This concept was initiated due to the failure of completed projects where only funds utilized by governments or any other organizations alone. Therefore in this project also minimum of 20% community contribution were introduced.

### Community Action Planning

Community action planning is one of the most important tools in participatory approach. This was done in the project after the selection of final option for implement the water supply system. Experienced staff of partner organizations conducted the community action planning session and all the executive committee members of CBO were participated. All the activities throughout the whole process in construction and operation and maintenance were scheduled and agreed for the time frame in the workshop.

### Legalizing of CBO

CBO should have legal powers and autonomy to work as an independent organization within the small town area. They are accountable to members of the CBO and also they are binding with the present governing rules and regulations in the country. Therefore, the project has taken step to register these independent organizations under the law prevailing in the country as legal entity. For this reason all CBOs were registered in Divisional secretariat office under the social service law and also in the Ministry of Urban Development Water Supply.

### Training & capacity building

Training and capacity building is an essential item for this type of project for the sustainability of constructed facilities. The project had a separate funding package for training and capacity building under the NORAD program. This has included all the technical, financial, social, environmental training program to suit to CBOs, partner organization staff, project staff, local authority staff etc. In addition to the training the NORAD component of the project provided toolkits to CBOs, transport facilities to CBOO and local authorities for smooth functioning of project activities.

### Signing Of Memorandum of Understanding (MOU)/Agreements

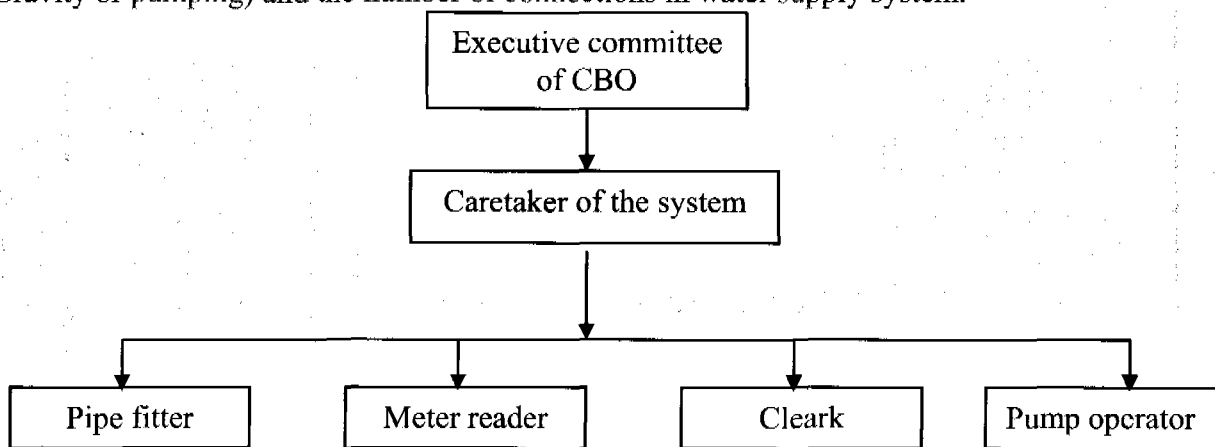
This is an important decision taken by the project for the sustainability. These MOUs were signed between NWSDB, Local authorities and CBOs on backup support for the operation and maintenance of small town water supply system which is maintaining by CBO or Local authorities. The MOU clearly defined the role of each party during operation and maintenance phase. It is helpful to get the required support to CBO at

various points from the local authority office. As example, the local authority will support to CBO at preparation of technical specifications for pumps, preparation of tariff, involvement of settling disputes etc. (Annex F).

The above-mentioned actions are some of the major actions taken by the project for sustainability of Water Supply Systems constructed for small towns. There are more. Those can be explained in details after the field study.

2.3.6 Institutional arrangement for the O&M

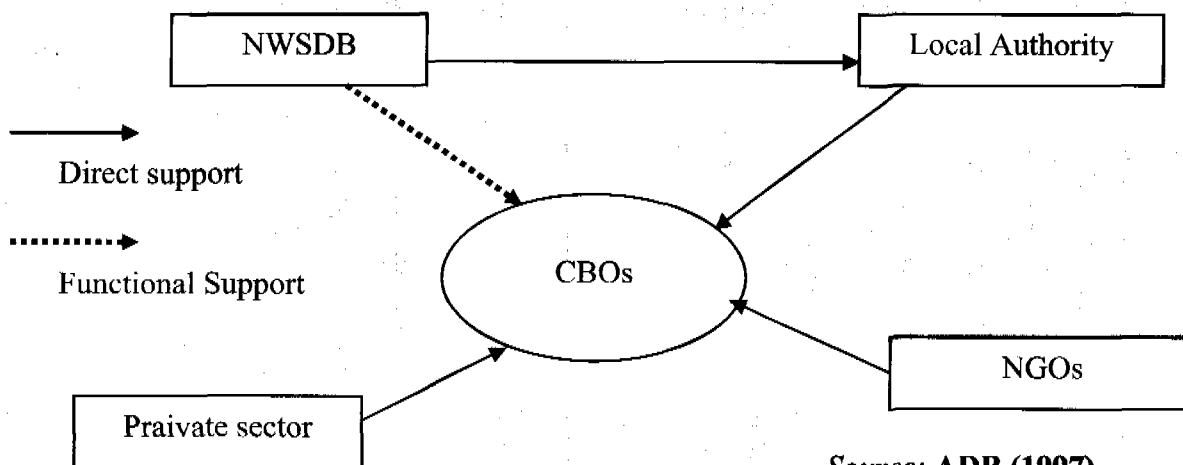
Institutional arrangements are made to support and supervise the operation of such systems. As mentioned in chapter one, there are three institutions were selected as operation and maintenance authorities among forty-seven small towns. Except CBOs, other two institutions are government and they have existing institutional arrangements for operations and maintenance of water supply systems. Therefore the following general model is introduced for CBO managed schemes. But it depends of the size, type (Gravity or pumping) and the number of connections in water supply system.



Source: ADB (1997)

Figure 2.2: CBO institutional arrangement in ADB project

The other important institutional arrangement structure was the system established for back up support system to support to especially for CBO and local authority managed schemes as follows.



Source: ADB (1997)

Figure 2.3: Backup support system in ADB project

### 2.3.7 Issues during implementation

The number of issues was identified during the project implementation period. These issues are mainly due to execution with new concept of participatory approach in the project. Because, most of the officers in project does not have more experience of the concept and they were oriented to do the rutting work. The other reason is the project work with number of out side agencies, such as NGOO, Local authorities, Private sector and CBOO at the same time. Some of the identified main issues are as follows.

- ✓ Selection of projects for implementation
- ✓ Selecting of experience NGOO as partner organizations
- ✓ Coordination among local, regional and national level politicians and their interferences
- ✓ Selection of water sources and options
- ✓ Assessing of willingness to pay
- ✓ Identification of actual community leaders
- ✓ Identification of appropriate and low-cost technologies
- ✓ Identification of training institutions to match the entire requirement
- ✓ Division among communities, such as cast, poor, rich, politics etc.
- ✓ Construction quality
- ✓ Transparency in CBOs
- ✓ Collection of community contribution
- ✓ Contracts awarding to CBOs with the existing regulations
- ✓ Conflicts between parties for water sources

## 2.4 Sustainability of small town water supply systems

### 2.4.1 Definition for sustainability of small town water supply systems

Sustainability is in general protecting our natural resources and ecosystems and preserving them for future generation (Cotruvo et al, 1998). But in the context of small town water supply, a system is sustainable when it provides an efficient and reliable service at desired level and it is being used an efficient way. The users financing or co-financing and active participation for the construction and managing of facilities also lend a hand towards sustainability of the system. But there should be a limited and feasible external and technical support to run the system smoothly. The benefit of the facilities should also be continued over a prolonged period (Sharma, 2006).



## 2.4.2 Factors effecting for sustainability of water supply system

Followings can be considered as key factors of sustainable Water Supply System

### Integrated planning

The planning of water supply should be done with integration of various factors. It is because; the water supply systems are linked with, water resource management, sanitation, health education, cultural habits and various social issues. Therefore integrated planning is essential factor for sustainable water supply system.

### Community participation and management

Community participation and management in water supply are giving considerable impact on sustainability of systems. Because the active participation during construction gives the sense of ownership to the community. Furthermore and management of the system by community means they are self-reliance and not depend on others. Hence the community can take their own decisions on their water supply system. But the ability of the community to manage a system will depend on

1. Resources required maintaining the system
2. Resource within the community
3. Resources it can draw on from outside the community  
(Sharma, 2006)

### Technology selection

Selection of technology is an important factor for sustainability of small town water supply system. The selected technology should be appropriate for the specific community. It means, the selected technology is accessible, function, good quality, and manageable to them and also environmentally sound. (Thalhamer and Enson, 1998)

### Community financing

Community financing create the sense of ownership among community and it is on the way to use the system safely and efficiently.

### Operation and Maintenance

Operation and Maintenance is a key factor for all the water supply systems for sustainability. The system should be managed at the lowest appropriate level to get the better results. Because for the efficiency and the cost effectiveness are important for better operation and maintenance. Both efficiently and cost effectiveness can be achieved in decentralised system.

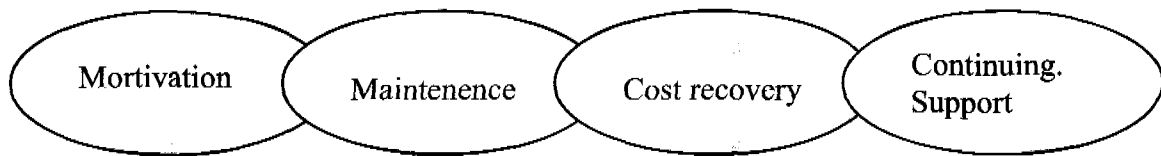
### Continued institutional support

Continued institutional support is essential for sustainability of water supply systems managed by communities. At the beginning in community manage water supply system

may not face much problems, because the system is new. But during the operation and maintenance period, the system might face technical, social, financial, institutional and environmental problems. Therefore it is necessary to have continued support from outside agencies to help them to solve these problems. Such support can be delivered from Local authorities, national and regional government sector organisations, private parties, NGOs, etc.

#### 2.4.3 Components of sustainability

Sustainability of water supply sanitation systems involves a chain of four main links and the failure of one link that will result in failure of entire process (Sharma, 2006). The components of this chain are shown in figure 2.4.



Source: Sharma (2006)

**Figure 2.4: Sustainability Chain**

#### 2.4.4 Dimensions of sustainability

##### 2.4.4.1 Technical sustainability

According to the World Bank (2002), for the reliable and correct functioning of the technology and for water supplies, the delivery of enough water of an acceptable quality is important. A requirement of technical sustainability includes; a technically good design, which is, adhered to in construction and operations, first rate workmen.

Other indicators of technical sustainability include

- I. Technical consideration for feasible extensions,
- II. Availability of spare parts,
- III. Existence of trained staff,
- IV. Priority for preventive maintenance,
- V. Less non revenue water,
- VI. Acceptable quality of water and no frequent interruptions.

##### 2.4.4.2 Financial sustainability

Systems can only function, if financial resource meets at least the cost of operation, maintenance and common repairs. Equity elements relate to who pays for all this and how fairly payments are shared between and within households (World Bank, 2002).

Other indicators of financial sustainability include

- I. Good income,
- II. Efficient billing and collection system,
- III. Annual auditing,
- IV. Correct book keeping,
- V. Transparency of accounts to users and best stores management practices.

#### 2.4.4.3 Institutional sustainability

To keep system operational, accessible and widely used, communities need institutions. Institutions have cultural characteristics, and valued procedures and rules for operations, and varying capacities for management and accountability. Equity considerations require looking at the extend of voice of all the users groups, especially the poor and women in that manage and control the service (World Bank, 2002).

Other indicators of institutional Sustainability include

- I. No dominations of office bearers,
- II. Officers not get more benefits,
- III. Action for illegal connections and other illegal actions,
- IV. Continuous training,
- V. None biased politics,
- VI. Better coordination among other stake holders,
- VII. Permanent place for operation as office and rules,
- VIII. Monitoring and evaluation of workers performance and regulations operational staff.

#### 2.4.4.4 Social sustainability

Users will only sustain services that satisfy their expectations. This means service that they can easily access that is in accordance with their socio-cultural preference and practices, and service that they consider worth the cost they incur to obtain them. Equity aspects include looking at how fairly the benefits from the service are shoved across different socio-economic, gender and ethic or cast group (World Bank, 2002)

Other indicators of social sustainability include

- I. Better Consumer relation,
- II. Involvement of social development activities,
- III. Gender balance,
- IV. Meetings according to constitution poorest to be considered,
- V. Hearing for users voice.

#### 2.4.4.5 Environmental sustainability

Water faces multiple threats. Over extraction and contamination of water service from irrigation, industrialization, and waste disposal threaten reliable and safe drinking water supplies. Water supply and sanitation facilities them self threaten the environment through the unsafe disposal of waste water and human and solid waste. In dry areas, lack of drainage of waste water has created new risks of insect breeding that have brought outbreaks of malaria, dengue etc. Equity aspects include fair sharing of responsibility among users for the protection of their environment and water resource.

Other indicators of environmental sustainability include

- I. Water source flow measurements, no discharge pollutants,
- II. Water quality monitoring,
- III. Participatory catchments development programme,
- IV. Integrated water resource management.

## 2.5 Case studies on small town water supply

### 2.5.1 Small town water supply project in Philippine (ADB, 2006)

At the time of project appraisal urban water supply in Philippines was not sufficient. In small towns the coverage is much less than urban national average. Therefore the increasing of coverage is the national priority of the Philippine government. In September 1998, the ADB approved the Small Town Water Supply Sector Project and the objectives of this project are

1. Provide safe adequate reliable piped water supplies to selected small urban communities.
2. Improve health, hygiene education, and water quality testing to ensure the sustainability of project benefits.
3. Improve the capacity of water districts operation and maintenance of water supply systems.

The project target was to cover 80 small towns through out the country. Lessons learned from the previous ADB projects, the community participation in implementation and operation and maintenance approach was introduced to this project.

The Local Water Utilities Administration (LWUA) of Philippines is the executing agency for the project and it is responsible for the managing and coordinating with other central government agencies on project activities.

Overall technical sustainability of the project directly depends on the technical sustainability of the individual sub projects and the financial and human resources availability in water districts. Generally in small water districts this is the major problem.

Generally the project has positive socio economics impacts such as increased access safe portable drinking water to reduce incidence of water born deceases, eliminate the time consumed to fetching of water from unprotected sources, creation of favorable condition to enhance the commercial activities and creation of temporary jobs during construction of water supply systems.

The expected negative impacts due to operation of the project are

1. Exploited of natural water resources could diminish their availability in quantity due to over extraction and deteriorate quality due to an un safe use
2. Increase of water usage may lead to increase of gray water will effect to the quality of surface water sources due to lack of sewage collection system.
3. Increasing of pollution of ground water due to use of septic tanks, which may pollute shallow wells still using as drinking water source in some areas.

### 2.5.2 Water supply sector project in Indonesia (ADB,2002).

The objectives of the project is to provide reliable adequate and safe drinking water and sanitation facilities to rural growth centers, villages and kecamatan towns through community based arrangement and to support hygiene and sanitation education, water quality surveillance and community management technique for targeted communities. The project funded by ADB and implanted in 1996.

The project area includes all 12 provinces of islands of Sumatra and Kalimantan and covered 80 kabupatens. According the previous small town project experiences it is recommended address the following issues during the implementation of the project by ADB.

1. Insufficient community consultation and participation in planning, design and construction.
2. Initial problem of construction due to in experience local contractors.
3. Poor community acceptance in selection of sub projects, which results the slow up, take of house connection and inadequate cot recovery.
4. Lack of trained staff for water enterprises
5. The use of in appropriate technology.

The directorate is the general of Rural Settlement of Ministry of Settlement and Regional Development of the executing agency of the project.

#### **Lessons learned**

1. The poor location and choice of the technology probably occurred to failure of the project to involve communities in decision making in planning.
2. The project does not change from supply-oriented approach to customer-oriented approach. It results failure of more sub projects.
3. The project management system was lacking and certainly there was no quality management system.
4. Lack of coordination among other stakeholders.
5. Institutional strengthening was limited to tarining



### 3.0 RESEARCH METHODOLOGY

This chapter presents the research methodology that was used to fulfil the objectives of this M Sc study. It consisted of following four phases.

1. Desk study
2. Field study
3. Identification of study area
4. Data analysis

Activities that were carried out in each of three phases are described below.

#### 3.1 Desk study

The desk study phase was used to review the literature on small town water supplies in Sri Lanka and the other places in the world on sustainability of small town water supply systems. The other activities in this phase were preparation of field data collection questionnaires, and establishment of data analysis criteria.

##### *3.1.1 Key issues identified for analysis*

Key issues of this study can be categorised on the basis of goal of the study and on specific objectives.

**Objective 1:** To review the implementation strategy of the project for the use of future projects, especially suitable to the Sri Lanka situation

**Issues:**

- i. Selection criteria of small towns and NGOs
- ii. Method used to enter the community
- iii. Criteria for selection of options
- iv. Strategy used for finalise the options
- v. Construction phase activities
- vi. Training of operation and maintenance authorities
- vii. Establishment of back up support system
- viii. Handing over process
- ix. Coordination system in backup support system.

**Objective 2:** To review institutional arrangement established for the sustainability of water supply schemes and also give recommendations to improve the coordination arrangement among all stakeholders.

**Issues:**

- i. Present institutional set-up
- ii. Regulations for operational activities
- iii. Training activities of operation and maintenance authorities

**Objective 3:** To suggest measures to improve the backup support system to ensure sustainability of small town water supply systems.

**Issues:**

- i. Present institutional set-up for backup support system
- ii. Linkage and coordination mechanism between all Institutions.



### 3.1.2 Selection of indicators for data collection

Selected indicators used in this study to develop strategies to improve the operation and maintenance activities of small town water supply systems towards sustainability are as follows:

**Table 3.1 - Sustainability issues and performance indicators of small town water supply systems**

| Issue         | Indicator  |
|---------------|--|
| Technical     | 1. Water quality                                       |
|               | 2. Water quantity                                      |
|               | 3. Accesability  |
|               | 4. Reliability   |
|               | 5. Duration of water supply                            |
|               | 6. Residual pressure                                   |
| Institutional | 1. Community involvement in planning & design          |
|               | 2. Process of formation of water user committee        |
|               | 3. Woman involvement in water user committees          |
|               | 4. Meeting of O& M authority officers                  |
|               | 5. Transparency of transactions/accounts               |
|               | 6. Regulations for operational activities              |
| Social        | 1. Sence of ownership                                  |
|               | 2. Arrangement of general meetings                     |
|               | 3. Informing of major repairs/breakdowns               |
|               | 4. Getting help for common O&M activities              |
| Financial     | 1. Water tariff  |
|               | 2. Collection of monthly water bill                    |
|               | 3. Annual auditing and publishing of report            |
|               | 4. Willingness to pay                                  |
|               | 5. Affordability                                       |
| Environmental | 1. Catchments preservation activities doing by CBO/LA  |
|               | 2. Cleanness in treatment plant, reservoir etc.        |
|               | 3. Management around waste around water points/sources |
|               | 4. Water conservation measures                         |

### 3.1.3 Data collection tools

Selected data collection tools in this study were

1. Interviews
2. Discussions with key informants
3. Collection of data available at Management Information System (MIS) in project management unit and project implementation units.

### 3.1.3.1 Design of questionnaires

Questionnaires for field data collection were developed depending on issues, indicators and informants related to goal and specific objectives. Accordingly, following 7 sets of questionnaires were prepared.

1. Household questionnaire (Annex A.1).
2. NGO questionnaire (Annex A.2).
3. Operation and maintenance authority questionnaire (Annex A.3).
4. Local authority questionnaire (Annex A.4).
5. Project Implementation unit questionnaire (Annex A.5).
6. Project management unit questionnaire (Annex A.6).
7. NWSDB regional office questionnaire (Annex A.7).

### **3.2 Identification of study area**

The selection of 4 representative small town water supply systems from 46 small town water supply systems completed under the ADB third water supply sanitation project were based on following criteria listed below (see Annex B for details). Preliminary details of 46 small town water supply systems are in Annex C and analysis is shown in Annex D.

1. Annual average rain fall of the area
2. Management Authority
3. Technology(Pumping or Gravity)
4. Total population of the small town
5. Water supply coverage
6. Water consumption per day per family
7. Available treatment facilities
8. Action taken for water source protection
9. Affordability of water tariff
10. Capacity of water source to meet the required demand.

For the selection water supply systems from dry and wet district the criterion (1) was used with equal marks. The criterion (2) was used with the high marks to CBO because of the request of the ADB project that they need to get the view of CBO managed

systems due to community participation approach is new to the NWSDB. The criterion (3) was used to distinguish between pumping and gravity systems in the study. The ADB project insists to ensure these systems followed the population and water supply coverage criteria in RWS policy. Therefore criteria (4) and (5) used to fulfill that requirement. The criteria (6) and (10) were used to analyze water demand in small town area and how that demand has been met by selected water source. Type of treatment facilities were evaluated by criterion (7) and the effect of selected treatment methods for affordable water tariff were analyzed by criterion (9). Criterion (8) used because the ADB project need to know the weather the source protection programs are functioning because; ADB was insists to do this activity during project implementation.

Reasons for the selection of Kuruwita small town water supply system from World Bank project as follows.

1. It was implemented about 9 years ago, and that period the NWSDB was engaged in Kuruwita small town water supply system on the special request of World Bank project unit (CWSSP) which was established in Ministry of Urban Development and Water Supply. Therefore, the project implementation process used for Kuruwita small town water supply system differs from ADB project but same approach of community participation was used.
2. Presently the Kuruwita water supply system has management issue due to conflict between two groups in CBO. Therefore NWSDB required to study and give recommendations to deal with similar situation in future ADB project.
3. Study of sustainability dimensions in Kuruwita water supply system after 9 years to evaluate present situation and to identify the dimensions which need more attention in long run.

### 3.3 Field study

The field study consisted of interviews and data gathering from different stakeholders related to the small town water supply systems in the study area.

Following individuals and institutions were interviewed on basis of goal and objectives.

1. 25 households from each of the five selected small town water supply systems. In total 125 persons were interviewed from the beneficiaries.
2. Five operation & maintenance authorities in selected small town water supply systems and 5 persons from each water supply system. In total 25 key persons were interviewed from CBOs.
3. Five NGO involved in selected small town water supply systems and in total 15 persons were interviewed from NGOs, 3 persons from each.
4. Chairman, officers and members of 5 local authorities relevant to the selected small town water supply systems were interviewed and in total 15 were involved for evaluation
5. Three key officers in ADB project implementation units (PIU) were interviewed then total of 6 persons from two PIUs.

6. Three key officers in ADB project management unit and project director were interviewed.
7. Three officers in NWSDB regional offices relevant to the selected small town water supply systems were interviewed and all together 6 persons were involved.

In total of 196 persons were interviewed during the field study with the help of PIUs and NWSDB regional office staff.

### 3.4 Data analysis

#### 3.4.1 Assessment of operation and maintenance activities towards sustainability

Based on the data collection, evaluation matrixes were developed for each type of respondent. Every question in each category of respondent is related to a sustainability aspects and corresponding criteria.

The answers for each question were evaluated with a scoring scheme. The general ranking/evaluation scheme for each question is given in table 3.2. The additional ranking system which was required for analyzing specific questions in questionnaires is given in Annex A.

After getting scores for each question, it was included to sustainability analysis matrix for each category. The average score for each sustainability aspect was calculated from the average score of all the questions included in that particular aspect.

**Table 3.2 - General ranking system for questions**

| Criteria     | Score |
|--------------|-------|
| Very good    | 100   |
| Good         | 75    |
| Satisfactory | 50    |
| Poor         | 25    |
| Very Poor    | 00    |

**In addition to the above general ranking system, additional ranking was used for each and every questionnaire depending on specific questions (Annex A).**

#### Threshold score or minimum required score

For this study, a score of 75 was considered as a threshold or minimum required value. The scores obtained by different aspects between 100-75 were considered very good and not necessary to improve and scores obtained below 75 were considered insufficient and should be improved. This decision was taken after the several discussions with sociologist and chief engineer who are working in the project implementation unit.

Assessment of operation and maintenance activities towards sustainability was done using survey data of households and O&M authority. Different sustainability aspects, related criteria for each of these are included in table 3.3 and 3.4.

### 1. From Households about O & M authority activities

**Table 3.3 - Sustainability aspects and relevant criteria for small town water supply systems**

| Sustainability aspects | Criteria  | Score |
|------------------------|---|-------|
| Technical              | 1. Water quality                                |       |
|                        | 2. Water quantity                               |       |
|                        | 3. Accesability                                 |       |
|                        | 4. Reliability                                  |       |
|                        | 5. Duration of water supply                     |       |
|                        | 6. Residual pressure                            |       |
|                        | <b>Average score obtained</b>                   |       |
| Institutional          | 1. Community involvement in planning & design   |       |
|                        | 2. Process of formation of water user committee |       |
|                        | 3. Woman involvement in water user committees   |       |
|                        | 4. Meeting of O& M authority officers           |       |
|                        | 5. Transparency of transactions/accounts        |       |
|                        | 6. Regulations for operational activities       |       |
|                        | <b>Average score obtained</b>                   |       |
| Social                 | 1. Sence of ownership                           |       |
|                        | 2. Arrangement of general meetings              |       |
|                        | 3. Informing of major repairs/breakdowns        |       |
|                        | 4. Getting help for common O&M activities       |       |
|                        | <b>Average score obtained</b>                   |       |
| Financial              | 1. Collection of monthly water bill             |       |
|                        | 2. Annual auditing and publishing of report     |       |
|                        | 3. Encouraging to use of water saving apparatus |       |
|                        | 4. Willingness to pay                           |       |
|                        | 5. Affordability                                |       |
|                        | <b>Average score obtained</b>                   |       |
| Environmental          | 1. Catchments preservation activities by CBO    |       |
|                        | 2. Cleanness in treatment plant, reservoir etc. |       |
|                        | 3. Management waste around water points/sources |       |
|                        | <b>Average score obtained</b>                   |       |

The overall score was calculated as the average of the scores of all 5 sustainability aspects

## 2. From O &amp; M authority

Table 3.4 - Sustainability aspects and relevant criteria for small town water supply systems

| Sustainability aspects | Criteria  | Score |
|------------------------|---|-------|
| Technical              | 1.Actions taken to maintain acceptable water quality                                  |       |
|                        | 2.Supply of required water quantity   |       |
|                        | 3.Duration of water supply<br>(24h, 18h, 12h, 6h, 2h)                                 |       |
|                        | 4.Keeping residual pressure at 20mcw  |       |
|                        | 5.Monitoring of NRW   |       |
|                        | <b>Average score obtained</b>   |       |
| Institutional          | 1.Time taken to act on consumer complains   |       |
|                        | 2.Record keeping, such as break downs, consumer complains, stores, accounts etc.      |       |
|                        | 3.Time taken to attending a breakdowns  |       |
|                        | 4.Getting involvement of women for decision making                                    |       |
|                        | 5. How frequent meet an O& M authority officers?                                      |       |
|                        | 6.Actions taken to show transparency of transactions/accounts to consumers            |       |
|                        | 7.Billing and collection system   |       |
|                        | 8. Rules and regulations for water thereat and disconnections of illegal connections. |       |
|                        | <b>Average score obtained</b>   |       |
| Social                 | 1. How frequent arrange consumer meetings?  |       |
|                        | 2.Actions taken to inform to consumers major repairs/breakdowns in advance            |       |
|                        | 3. Actions taken to building of sense of ownership among users.                       |       |
|                        | <b>Average score obtained</b>   |       |
| Financial              | 1.Collection efficiency of monthly water bill   |       |
|                        | 2.Annual auditing and publishing of report  |       |
|                        | 3.Actions taken to encourage consumers to install of water saving apparatus           |       |
|                        | <b>Average score obtained</b>   |       |
| Environmental          | 1.Actions taken to preserve catchments  |       |
|                        | 2.Keeping clean environment in treatment plant site, reservoir site etc               |       |
|                        | 3.Actions taken to manage waste around water points/sources                           |       |
|                        | <b>Average score obtained</b>   |       |

### 3.4.2 Assessment of implementation arrangement

Assessment of implementation arrangement was done on the basis of response of NGO, LA, O&M authority, PIU and PMU on different questionnaires related to implementation arrangements.

The main issues/questions for this are included in table 3.5.

The answer for each question was evaluated with a scoring scheme given in table 3.2. After getting scores for each question, it was included to implementation arrangement matrix for each category. The average score for each criterion was then calculated from the average of all questions included in that aspect.

**Table 3.5 – Criteria for assessment of implementation arrangement of small town water supply systems**

| Implementation steps                                    | Response |     |     |     |     | Avg. |
|---|----------|-----|-----|-----|-----|------|
|   | NGO      | L/A | O&M | PIU | PMU |      |
| 1.Selection criteria of small towns for implementation  |          |     |     |     |     |      |
| 2.Selection criteria of NGOs for community mobilisation |          |     |     |     |     |      |
| 3.Method used to enter the community in small towns     |          |     |     |     |     |      |
| 4.Criteria for selection of water supply option         |          |     |     |     |     |      |
| 5.Strategy used for finalising the water supply option  |          |     |     |     |     |      |
| 6.Construction phase activities                         |          |     |     |     |     |      |
| 7.Training given to O & M authorities                   |          |     |     |     |     |      |
| 8.Handing over process of WSS to O&M authority          |          |     |     |     |     |      |
| 9.Establishment of backup support system                |          |     |     |     |     |      |

### 3.4.3 Assessment of institutional arrangement

Assessment of implementation arrangement was done on the basis of response of LA, O&M authority and NWSDB regional office on different questionnaires related to implementation arrangements.

The main issues/questions for this are included in table 3.6

The answer for all questions was evaluated according to the scoring scheme given in table 3.2. After getting scores for each question, it was included in institutional arrangement matrix for each category. The average score for each criterion was then calculated from the average of all questions included in that aspect.

**Table 3.6 – Criteria for assessment of institutional arrangement of small town water supply systems**

| Institutional set-up  | Response |     |       | Avg. |
|---|----------|-----|-------|------|
|   | O&M      | L/A | NWSDB |      |
| 1.Present institutional set-up of O&M authorities   |          |     |       |      |
| 2. Regulations for O & M activities (For illegal connections, disconnections, billing and collections etc.) |          |     |       |      |
| 3.Training activities   |          |     |       |      |
| 4.Office and other logistic facilities  |          |     |       |      |
| 5.Selection of office bearers   |          |     |       |      |

#### 3.4.4 Assessment of backup support system

Assessment of backup support system was done on the basis of response of LA, O&M authority and NWSDB regional office on different questionnaires related to backup support system.

The main issues/questions for this are included in table 3.7

The answer for each question was evaluated with a score scheme. The ranking/evaluation scheme for each question is given in table 3.2.

After getting scores for each question, it was included in backup support system matrix for each category. The average score for each backup support system was then calculated from the average of all the questions included in that aspect.

**Table 3.7 – Criteria for assessment of backup support system of small town water supply systems**

| Backup support system                                 | Response |     |       | Avg. |
|---|----------|-----|-------|------|
|   | O&M      | L/A | NWSDB |      |
| 1.Technical support from other institutions           |          |     |       |      |
| 2.Availability of maintenance fund                    |          |     |       |      |
| 3.Linkage between all Institutions                    |          |     |       |      |
| 4.Followup training                                   |          |     |       |      |
| 5.Coordination mechanism                              |          |     |       |      |
| 6.Availability of maintenance fund                    |          |     |       |      |
| 7.Loan facilities for urgent repairs and improvements |          |     |       |      |



## 4.0 RESULTS AND DISCUSSION

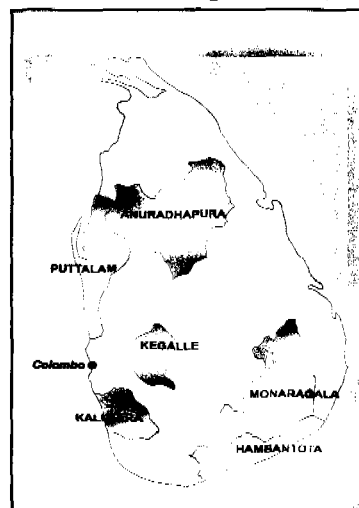
### 4.1 Introduction

This chapter presents the analysis of selected four existing water supply systems implemented under the ADB third water supply and sanitation project and one water supply system implemented under the World Bank project. These water supply systems are situated in three districts in Sri Lanka. The general descriptions of each water supply system are presented separately. After that the analysis on project implementation, institutional arrangement of O&M authorities (CBOs), backup support system and the overall sustainability of each water supply system is elaborated in the next part.

Firstly water supply systems in dry and wet districts and the water supply system out of the ADB project area (WB project) were compared separately. On project implementation, institutional arrangement of, backup support system and the overall sustainability. Secondly all five water supply systems were compared on dry Vs wet districts and ADB Vs WB projects on same criteria mentioned above. Finally short and long-term strategies and responsible organizations to improve the existing situation have been outlined.

### 4.2 Small Town Water Supply systems implemented under the ADB third project

The ADB third water supply and sanitation project was started in a year 1999 and it was implemented in six districts of Sri Lanka. They are Anuradapura, Puttalam, Monaragala, and Hambantota from dry areas and Kalutara, and Kegalle from wet areas. The total estimated project cost is US\$ 121 million. The local component of the project is US\$ 77.3 million and foreign component is US\$ 43.7 million. About US\$ 7.0 million is to be borne by project beneficiaries as community contribution. This is 6 % of the total estimated cost. Main project components are six urban water supply systems, Anuradapura greater water supply system, 1000 rural village water supply systems, sanitation facilities to 80,000 individuals and 46 small town water supply systems. The estimated cost for the small town water supply component of the project is US\$ 12 million. Project districts are shown in Figure 4.1 (ADB, 1997).



Source: ADB (1997)

**Figure 4.1: Map of Sri Lanka with location of project districts**

Forty six small town water supply systems were completed under the above project and number of small town water supply systems implemented in each district is shown in table 4.1. All the other data of each small town water supply system is included in Annex C.

**Table 4.1: Number of small towns implemented under the ADB project in each district**

| District type | District    | Number of schemes | Total |
|---------------|-------------|-------------------|-------|
| Dry           | Anuradapura | 9                 | 38    |
|               | Hambantota  | 18                |       |
|               | Puttalam    | 6                 |       |
|               | Monaragala  | 5                 |       |
| Wet           | Kalutara    | 3                 | 8     |
|               | Kegalle     | 5                 |       |

Source: ADB (1997)

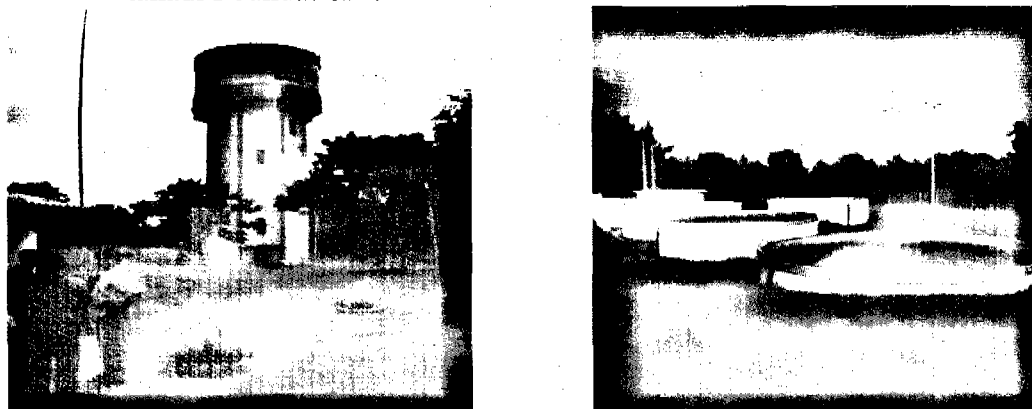
### 4.3 Analysis of selected water supply systems in dry district

This section presents the short description of two selected small town water supply systems from dry district and their analysis on project implementation, institutional arrangement, backup support system and overall sustainability.

#### 4.3.1 Description of selected water supply systems

##### Saliyawewa water supply system

Saliyawewa water supply system is situated in Puttalam district and it belongs to the dry zone of the Sri Lanka. "Kalaoya" river is the source for the system and the scheme consists of treatment facilities with aeration, sedimentation, filtration and chlorination for disinfection. There is a direct intake and water is directly pumped to the treatment plant. After the treatment, water is pumped to overhead tank from the clear water reservoir. Number of water connections is 1100 and about 5500 consumers are directly benefited from the water supply system. All the water connections are metered. The O&M authority of the water supply system is a community based organization (CBO) called "Kalanadi Foundation".



**Figure 4.2: Water tower and treatment plant site of Saliyawewa water supply system**

### Kirimetiyan water supply system

The second selected small town water supply system is Kirimetiyan water supply system and it is also sited in the Puttalam district in dry zone of Sri Lanka. The water source of the Kirimetiyan water supply system is two deep bore holes with the yield of 310 cubic meter/day each. Chlorination is the only treatment in this water supply system. Water is directly pumped to the overhead tank and after chlorination it is distributed to the entire area by PVC distribution network. There are 600 metered water connections in this water supply system and direct beneficiaries are about 3000. This water supply system is also managed by a CBO named "Wasana Shakthi".



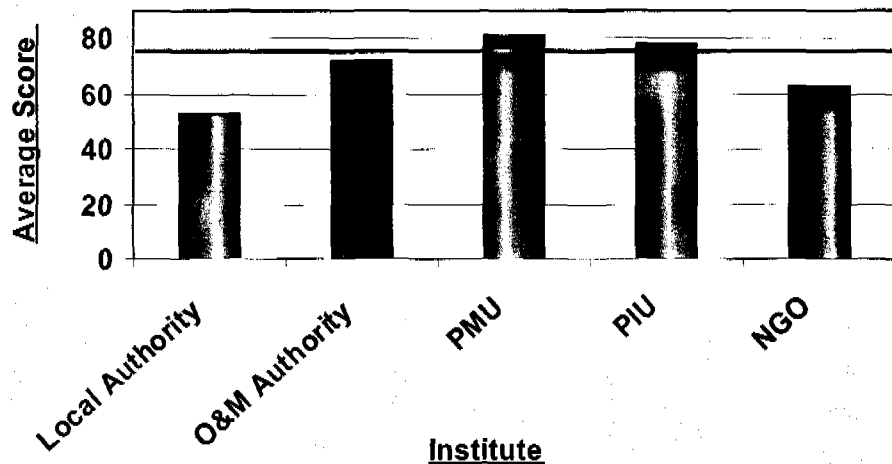
**Figure 4.3: Pump house and water tower of Kirimetiyan water supply system**

#### *4.3.2 Analysis on project implementation*

Analysis on the project implementation arrangement was done with the interviews based on the questionnaires in Annexes A.2, A.3, A.4, A.5 and A.6. Officers from relevant local authority, CBO, project management unit, project implementation unit and NGO were involved for the evaluation. Three officers from local authority including chairman, secretary and technical officer were interviewed. O&M authorities of these water supply systems are CBOs. Therefore CBO chairmen and secretaries, three executive committee members and caretakers were interviewed in each small town water supply system. Three key officers from project management unit and project implementation units participated for the assessment process. Project officer, technical officer and community facilitator of NGO also contributed their experience in evaluation procedure. In total 36 persons were interviewed to analyze the project implementation aspects for two small town water supply systems. Assessment and scoring was done based on the criteria mentioned in tables 3.5 and 3.2 respectively.

### Saliyawewa water supply system

Results of the survey of Saliyawewa water supply system in dry district on project implementation are shown in figure 4.4. It presents the average scores given by each agency on different related questionnaires in Annex A. Detail calculations and scores are presented in Annex E.

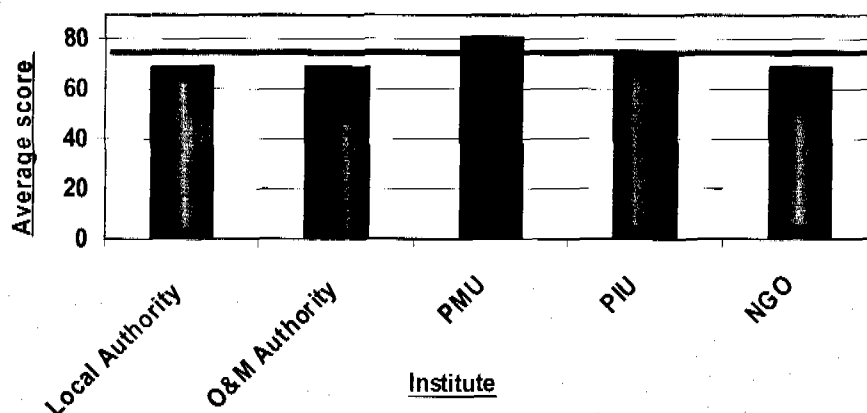


**Figure 4.4: Survey results on project implementation in Saliyawewa water supply system**

Figure 4.4 shows that, the scores for project implementation in the views of local authority and NGO are 53 and 62 respectively. But according to the project management and project implementation units the scores are above 75. Score on project implementation arrangement is 72 as per the view of CBO. The local authority is mainly not agreeing on the selection criteria of NGO and the selected NGO was not having good coordination during the implementation period with local authority. NGO score is below the acceptable level, because they did not get enough freedom on project activities and the project handing over process was also not according to their expectations. The project management and implementation units have given the score that are above the threshold value of 75, because they are the implementers of the project.

#### Kirimctiyana water supply system

Figure 4.5 shows the survey results (average scores) of the Kirimctiyana water supply system in dry district on project implementation which was given by each agency on different related questionnaires included in Annex A. Detail calculations and scores presented in Annex E.



**Figure 4.5: Survey results on project implementation in Kirimetiyan water supply system**

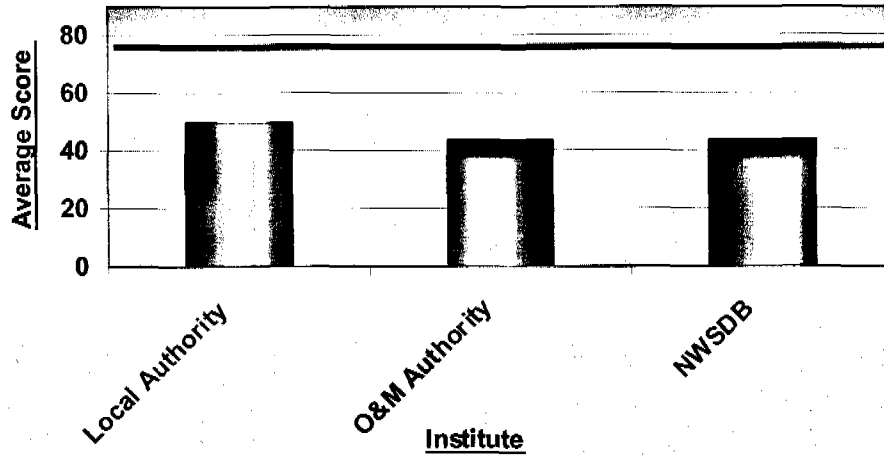
For project implementation the local authority, NGO and CBO gave the same score of 69 which is below the acceptable level of 75. In view of project implementation unit the score for project implementation process is equal to the threshold value of 75. In the view of project management unit the score is above the threshold value for project implementation. In this water supply system also local authority rate the project implementation below the minimum required level of 75 because of the same reasons as explained in Saliyawewa water supply system. The NGO score is also low because, they do not agree to the procedure used to enter the community and on the handing over process of water supply system to the community. Furthermore, the CBO score is also below the acceptable level because, they did not get enough support from NGO in implementation process. Therefore they also do not agree on selection criteria of NGO. As in the case of Saliyawewa water supply system, scores given by project management and implementation units are higher as they are the implementers.

#### 4.3.3 Analysis on institutional arrangement

Assessment on the institutional arrangement was also done as explained in the section 4.3.2. But the participating institutions and questionnaires were different. Institutions engaged on this analysis were relevant local authority, CBO and NWSDB regional office and questionnaires in Annexes A.2, A.4 and A.7 were used. As mentioned earlier, same officers from local authority and same number of executive members and caretaker of CBO participated in the evaluation. In addition to that, three key officers from NWSDB regional office also participated in the assessment process including regional manager, engineer and sociologist. In this evaluation 24 persons were involved for two small town water supply systems. The assessment and scoring was done based on the criteria mentioned in tables 3.6 and 3.2 respectively.

#### Saliyawewa water supply system

Average scores of the Saliyawewa water supply system in dry district on institutional arrangement are shown in figure 4.6 Results are based on the different related questionnaires in Annex A and related calculations can be referred from the Annex E.

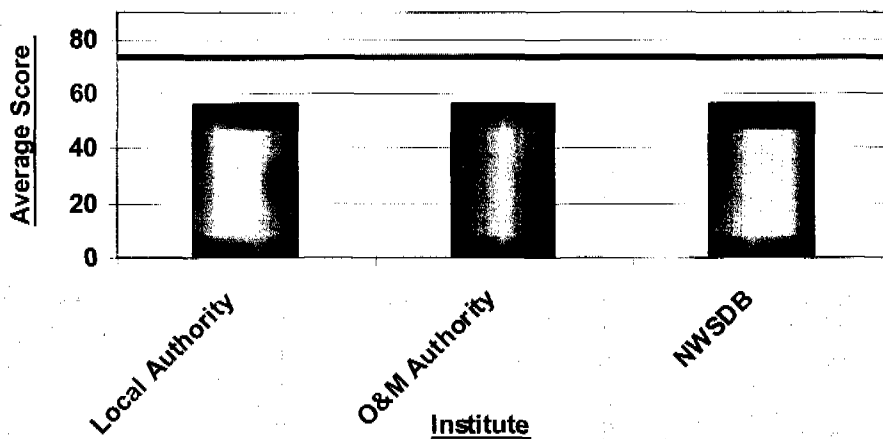


**Figure 4.6: Survey results on institutional arrangement in Saliyawewa water supply system**

The results of the evaluation show that according to three institutions scores for institutional arrangement are far below the accepted score of 75. One of the main reasons for the above results is that, the CBO does not have clear and acceptable constitution to operate the water supply system smoothly. It is badly affecting the sustainability of the system, because members of the executive committee do not have clear guidelines to work as independent organization. The other cause for the low scores from three organizations is that CBO is having internal conflicts among two groups, those who are living in two small town centers, on operation and maintenance activities such as valve controlling, attending to repairs etc.

Kirimetiyan water supply system

Results of the survey of Kirimetiyan water supply system in dry district on institutional arrangement are shown in figure 4.7. It shows the average scores given by each agency on different related questionnaires in Annex A and detail calculations and scores are presented in Annex E.



**Figure 4.7: Survey results on institutional arrangement in Kirimetiyan water supply system**

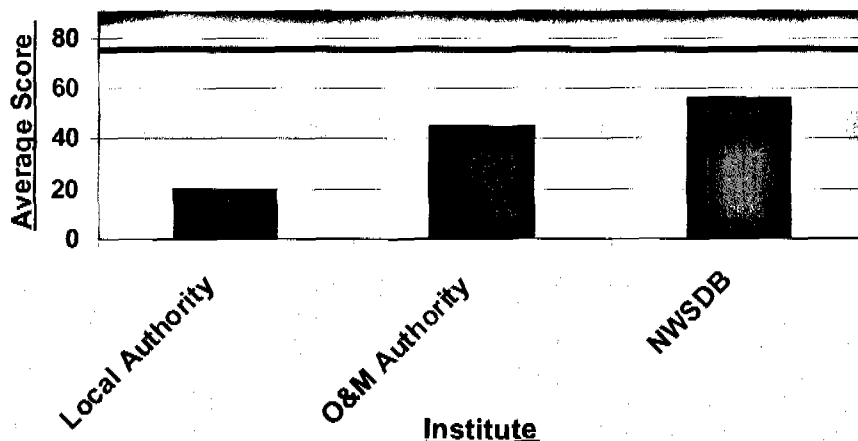
Results of the Kirimetiya water supply system are also similar to that of Saliyawewa water supply system. Figure 4.7 shows that in the view of three institutions, the scores are below the threshold value of 75 on institutional arrangement. Conflict between field operational staff and the CBO executive committee is one of the main reasons for the above results. This shows the poor management skill of CBO and it is directly affecting the sustainability of the system, because consumers are suffering from operational and maintenance issues such as frequent water supply interruptions, disinfection not up to standards etc. The internal conflict between consumer group and CBO is the other cause for the low scores from three organizations. This consumer group is living in separated area and they are considered as low cast group. This social issue was not addressed during the implementation period. Therefore, now it is one of the major issues for the CBO for operation and maintenance activities

#### 4.3.4 Analysis on backup support system

Backup support system was also analyzed similar to the assessment of institutional arrangement. Institutions engaged and number of officers that participated from each institution was also same. The assessment was done using the relevant questionnaires in Annexes A.2, A.4, A.7 and analysis and scoring was done based on the criteria mentioned in tables 3.7 and 3.2 respectively.

#### Saliyawewa water supply system

Figure 4.8 shows the average scores of the Saliyawewa water supply system in dry district on backup support system which was given by each agency on different related questionnaires incorporated in Annex A. Detail calculations of scores are presented in Annex E.

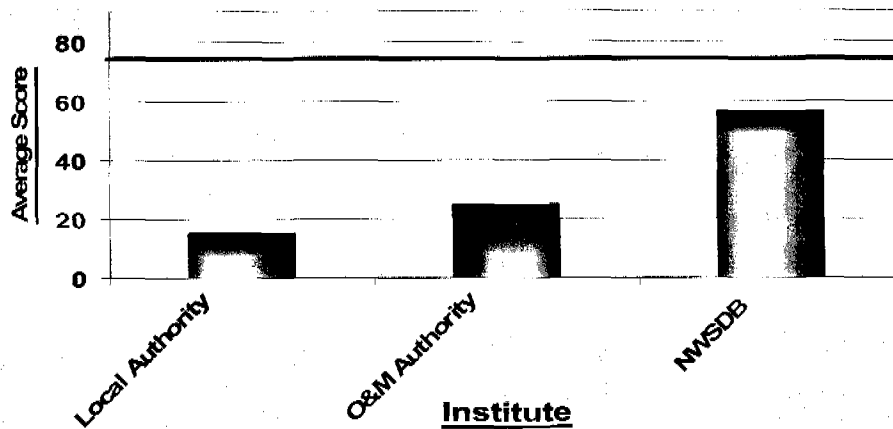


**Figure 4.8: Survey results on backup support system in Saliyawewa water supply system**

Figure 4.8 shows that in the view of all institutions scores for backup support system are below the accepted score of 75. Poor coordination among all the institutions is the main reason for the above results. This result is due to not functioning of the tripartite agreement (Annex F) signed between local authority, CBO and NWSDB after implementation of water supply scheme for backup support system. The mechanism for coordination among three institutions is clearly indicated in the agreement, but it has been neglected specially by the local authority.

### Kirimetiya water supply system

Average scores of the Kirimetiya water supply system in dry district on backup support system are shown in figure 4.9 Results are based on the different related questionnaires in Annex A and related calculations can be referred to the Annex E.



**Figure 4.9: Survey results on backup support system Kirimetiya water supply system**

Figure 4.9 depicts the three institutions surveyed gave lower scores on backup support system as in Saliyawewa water supply system. The main reasons underlying the poor backup support is the negligence of local authority on tripartite agreement (Annex F) as explained in the Saliyawewa water supply system.

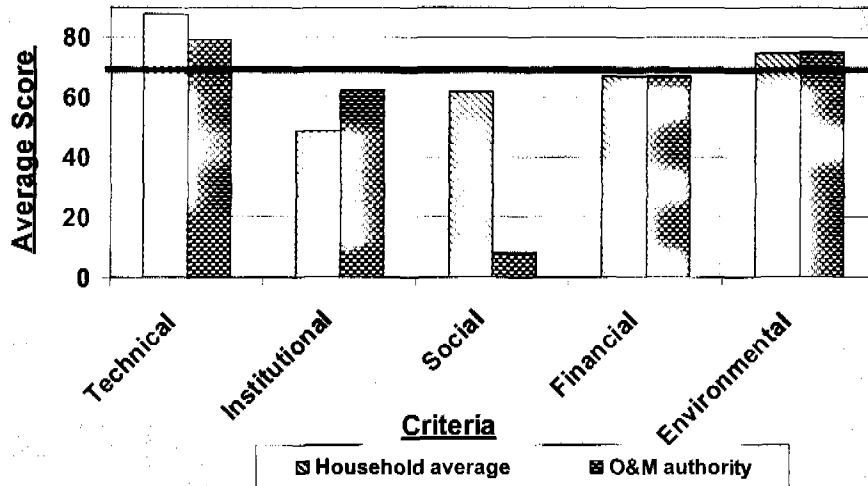
#### *4.3.5 Analysis on sustainability dimensions*

The survey for analysis on sustainability dimensions was done with randomly selected 25 households which are direct beneficiaries of water supply system and the officers of CBOs of the water supply system. Chairmen, secretaries, three executive members of CBO and caretaker participated for the assessment. In total 62 persons were interviewed to analyze the sustainability dimensions for two small town water supply systems. Results of the analysis are compared as views of households and management authority. The evaluation was done using the relevant questionnaires in Annex A.1 and A.2 and analysis was done based on the criteria mentioned in table 3.3 and 3.4 for households and for CBOs respectively and scoring was done as per the table 3.2.

### Saliyawewa water supply system

Average scores of the survey of sustainability dimensions for Saliyawewa water supply system is shown in the figure 4.10. Results are based on the different related questionnaires in Annex A and related calculations presented in the Annex E.

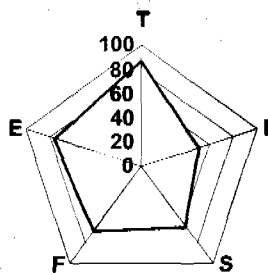




**Figure 4.10: Survey results on sustainability dimensions in Saliyawewa water supply system**

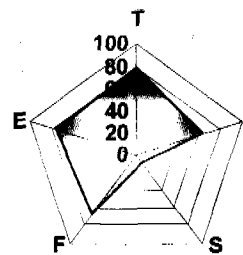
According to the survey, in the views of beneficiaries and management authority scores for technical aspects are 88 and 79 respectively. Scores for environmental sustainability aspect is 75 according to both parties. But for scores for the institutional, social and financial dimensions are not up to the set criteria of 75. Main reasons for the satisfaction on technical dimension of both households and management authority are water quality, water quantity, residual pressure, distance to water points and system losses are within appropriate range. The score for environmental dimension is also at the reasonable level, because CBO is launching catchments preservation program and water points and treatment plants are kept clean. The institutional, social and financial dimensions demonstrate poor performance due to conflicts between two groups of CBO, no clear constitution for CBO, no transparency on CBO accounts, executive committee and general members are not meeting regularly, less number of women representation in executive committee, poor record keeping on stores, breakdowns, repairs and consumer complains.

The average overall sustainability scores in view of households and CBO are 68 and 58 respectively which are below the acceptable value of 75. The sustainability diamonds for both household and CBO are presented in figure 4.11. Comparison of sustainability diamonds show that households view the water supply system more sustainable than the CBO.



**a) Households**

(T=Technical, I=Institutional, S=Social, F=Financial, E=Environmental)

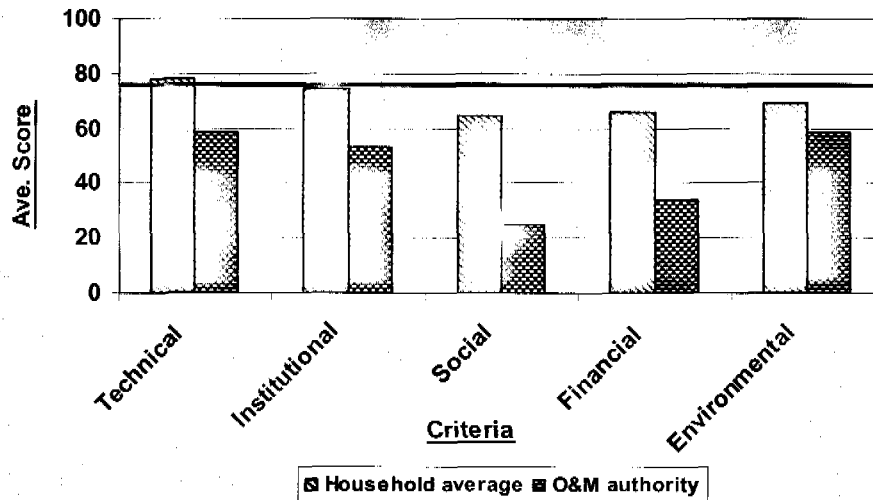


**b) O&M Authority (CBO)**

**Figure 4.11: Sustainability diamonds as expressed by Households and O&M Authority for Saliyawewa water supply system**

### Kirimetiya water supply system

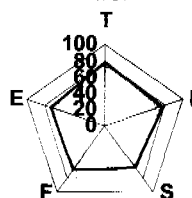
Results of the survey of Kirimetiya water supply system in dry district on sustainability dimensions are shown in figure 4.12. It shows the average scores given by each agency on different related questionnaires in Annex A. Detail calculations and scores are presented in Annex E.



**Figure 4.12: Survey results on sustainability dimensions in Kirimetiya water supply system**

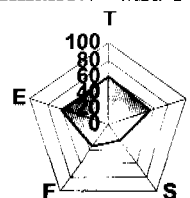
The score, in view of beneficiaries, for technical dimension is 78 which is above the acceptable level and scores for the institutional, social, financial and environmental dimensions are 74, 64, 66 and 69 respectively. However scores of the CBO do not meet the minimum required level of 75 in all sustainability dimensions of the water supply system. Reasons for the satisfaction of households on technical dimension are same as explained in the earlier section. The environmental dimension is also below the threshold value due to no action taken by CBO for catchments preservation. As per CBO all sustainability dimensions for water supply system do not meet the set criteria of 75 because, quantity of water supplied is not up to standard, conflicts between staff and CBO, checking of water quality is not done on regular basis and there is no specific catchments preservation program.

Figure 4.13 shows the sustainability diamonds for both households and CBO and average overall sustainability scores are 70 and 46 respectively which are below the threshold value of 75. Compared to households, the CBO rate the water supply system as highly un-sustainable with the lower scores on financial and social dimensions.



**a) Households**

(T=Technical, I=Institutional, S=Social, F=Financial, E=Environmental)



**b) O&M Authority (CBO)**

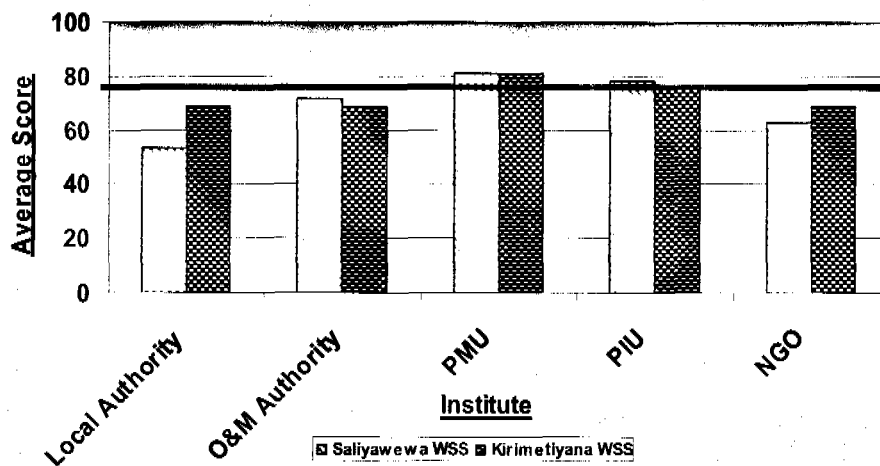
**Figure 4.13: Sustainability diamonds as expressed by Households and O&M Authority for Kirimetiya water supply system**

#### 4.4 Comparison of two small town water supply systems in dry district

Comparison of two water supply systems was done based on the individual scores of each water supply system on project implementation activities, institutional arrangement, backup support system and sustainability dimensions.

##### 4.4.1 Comparison of project implementation

Figure 4.14 shows the comparison of two small town water supply systems in dry district on project implementation activities.

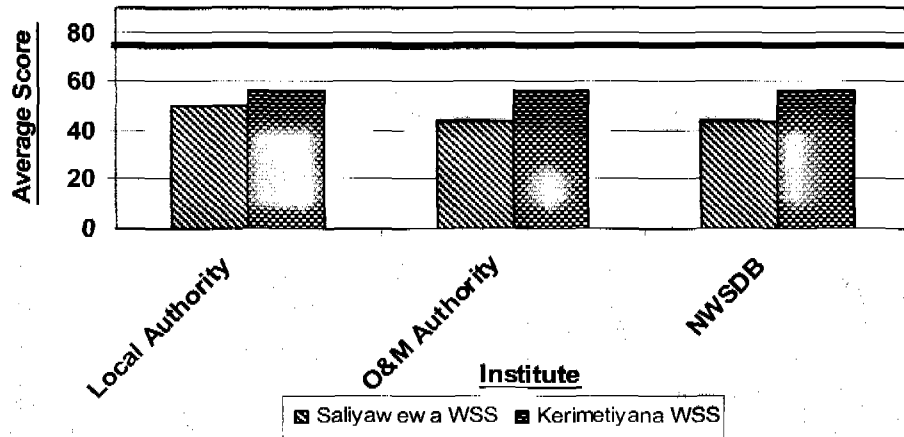


**Figure 4.14: Comparison of two small town water supply systems in dry district on project implementation**

According to the figure 4.14, in the view of local authorities, CBOs and NGOs the water supply systems do not meet the minimum required level of 75 on project implementation activities. But according to the project management unit and the project implementation unit, scores are above and equal to the threshold value of 75 respectively on the process of project implementation for both water supply systems. As mentioned earlier, both local authorities observed the shortcomings of project implementation process such as process of selection of NGO and the selected NGO not having good coordination during the implementation period. Both NGOs also did not give the score up to the set criteria of 75 as they did not get much freedom for project activities in project implementation phase. Project implementation and project management units gave high scores on both systems, because they are the implementers and they did not notice the weaknesses in the process of project implementation.

##### 4.4.2 Comparison of institutional arrangement

The two small town water supply systems in dry district were compared on institutional arrangement and results are shown in the figure 4.15.

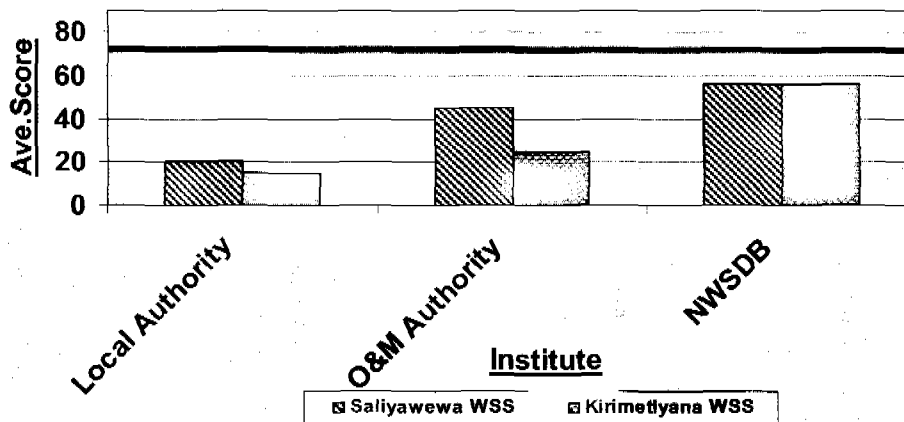


**Figure 4.15: Comparison of two small town water supply systems in dry district on institutional arrangement**

Figure 4.15 illustrates that according to local authority, CBOs and NWSDB present institutional arrangement for two water supply systems are not meeting the acceptable value of 75. Main reason for these results is that both CBOs are in unstable situation due to internal conflicts within their institutions as mentioned earlier. Therefore they are not in a position to serve up to the satisfaction of consumers.

*4.4.3 Comparison of backup support system*

A comparison of backup support system for two water supply systems in dry district is shown in the figure 4.16.



**Figure 4.16: Comparison of two small town water supply systems in dry district on backup support system**

As per the results in above figure in the view of local authority, CBOs and NWSDB regional office present backup support system for both water systems do not meet the minimum required level of 75. This was due to poor coordination mechanism among all institutions.

#### 4.4.4 Comparison of sustainability dimensions

Technical, institutional, social, financial and environmental sustainability dimensions in two water supply systems are compared based on the average scores given by households and CBOs on different related questionnaires in Annex A.1 and A.2. The following tables show the comparison of each sustainability dimension separately.

**Table 4.2(a): Comparison on technical sustainability of two water supply systems in dry district based on household survey**

| Sustainability factor       | Saliyawewa WSS | Kirimetiyanana WSS |
|-----------------------------|----------------|--------------------|
| 1. Water quality            | 80             | 74                 |
| 2. Water quantity           | 81             | 91                 |
| 3. Accesability             | 100            | 100                |
| 4. Reliability              | 89             | 66                 |
| 5. Duration of water supply | 94             | 61                 |
| 6. Residual pressure        | 72             | 73                 |
| Overall technical           | 88             | 78                 |

**Table 4.2(b): Comparison on technical sustainability of two water supply systems in dry district based on CBO survey**

| Sustainability factor               | Saliyawewa WSS | Kirimetiyanana WSS |
|-------------------------------------|----------------|--------------------|
| 1. Water quality                    | 75             | 25                 |
| 2. Actions to rectify water quality | 100            | 100                |
| 3. Water quantity                   | 75             | 50                 |
| 4. Water pressure                   | 50             | 50                 |
| 5. Monitoring of NRW                | 75             | 50                 |
| 6. Frequency of supply              | 100            | 75                 |
| Overall technical                   | 79             | 58                 |

Tables 4.2(a) and 4.2(b) show that the scores obtained for water quality parameter in Saliyawewa water supply system is 80 and 75 and in Kirimetiyanana water supply system is 74 and 24 in the views of households and CBO survey respectively. This is due to the presence iron in deep boreholes which are used as water source for Kirimetiyanana water supply system. Both systems are not checking water quality for physical parameters at all. But they are very keen on bacteriological water quality monitoring and it was checked every month for last two years regularly. Other parameters like water quantity supply, accessibility, reliability, duration of water supply and residual pressure is in Saliyawewa water supply system meets the acceptable level of 75 in both household and CBO survey. According to households, in Kirimetiyanana water supply system, water quantity supply, accessibility obtained scores of 91 and 100 respectively which meet the set criteria of 75. The other factors namely reliability, duration of water supply and residual pressure obtained 66, 61, and 73 respectively. The reason for getting of low

scores is the 6 hour duration of water supply to consumers in a day. The Saliyawewa water supply system is supplying 24 hours to their consumers.

According to CBO survey all the parameters in Saliyawewa water supply system meet the minimum required level of 75 except residual pressure. But as per the view of CBO in the Kirimetiya water supply system factors above the acceptable level of 75 are actions to rectify water quality and frequency of supply and other factors do not meet the set criteria. Overall technical sustainability scores in Saliyawewa water supply system is 88 and 79 for both households and CBO survey respectively. Scores are 78 and 58 for Kirimetiya water supply system as overall technical sustainability in views of households and CBO respectively. The major reason for the getting low scores in Kirimetiya water supply system is that water source is deep borehole and they do not have any treatment facilities except chlorination, but Saliyawewa water supply system has full treatment facilities.

Scores of overall technical sustainability in both systems meet the minimum required level of 75 except CBO results in Kirimetiya water supply system.

**Table 4.3(a): Comparison on institutional sustainability of two water supply systems in dry district based on household survey**

| Sustainability factor             | Saliyawewa WSS | Kirimetiya WSS |
|-----------------------------------|----------------|----------------|
| 1.Community involvement           | 80             | 74             |
| 2.Formation of CBO                | 81             | 91             |
| 3.Gender balance                  | 100            | 100            |
| 4.Frequency of meetings of CBO    | 89             | 66             |
| 5.Transparency in accounts of CBO | 94             | 61             |
| 6.Regulations for O&M             | 72             | 73             |
| Overall institutional             | 88             | 78             |

**Table 4.3(b): Comparison on institutional sustainability of two water supply systems in dry district based on CBO survey**

| Sustainability factor             | Saliyawewa WSS | Kirimetiya WSS |
|-----------------------------------|----------------|----------------|
| 1.Coverage                        | 100            | 50             |
| 2.Attending to consumer complains | 100            | 100            |
| 3.Record keeping                  | 75             | 25             |
| 4.Frequency of meetings of CBO    | 25             | 50             |
| 5.Transparency in accounts of CBO | 00             | 00             |
| 6.Billing and collection          | 75             | 75             |
| 7.Regulations for O&M             | 75             | 75             |
| 8.Gender balance                  | 50             | 50             |
| Overall institutional             | 63             | 53             |

In view of households in Saliyawewa water supply system the scores for community involvement, CBO formation, gender balance, record keeping, frequency of CBO meetings and transparency in accounts of CBO are up to the set criteria of 75 and that for regulations for O&M is below. In view of CBO coverage, attending to consumer complains, record keeping, billing and collection, and regulations for O&M activities are above the acceptable level and frequency of CBO meetings, transparency of accounts and gender balance are below the acceptance level. The main issue in this water supply system is that CBO does not have the constitution for the smooth functioning as a management authority.

The Kirimetiyanana water supply system does not meet most of the criteria to acceptable level of 75 except formation of CBO and gender balance in the view of household. Attending to consumer complains, billing and collection, regulations for O&M meets the minimum required level of 75 in CBO's view. Internal conflicts within CBO are badly affecting the sustainability of both CBO and water supply system in Kirimetiyanana.

Overall institutional sustainability scores are above the threshold value of 75 for both systems in the view of households, but CBO scores are below the acceptable level.

**Table 4.4(a): Comparison on social sustainability of two water supply systems in dry district based on household survey**

| Sustainability factor                    | Saliyawewa WSS | Kirimetiyanana WSS |
|--|----------------|--------------------|
| 1.Sense of ownership                     | 63             | 73                 |
| 2.Arrangement of general meetings        | 58             | 70                 |
| 3.Informing of major repairs/breakdowns  | 71             | 72                 |
| 4.Getting help for common O&M activities | 55             | 42                 |
| Overall institutional                    | 62             | 64                 |

**Table 4.4(b): Comparison on social sustainability of two water supply systems in dry district based on CBO survey**

| Sustainability factor   | Saliyawewa WSS | Kirimetiyanana WSS |
|---|----------------|--------------------|
| 1.Frequency of meetings with consumer   | 00             | 25                 |
| 2.Actions taken to inform to consumers on major repairs/breakdowns in advance | 25             | 50                 |
| 3. Actions taken to building of sense of ownership among users.               | 00             | 00                 |
| Overall social  | 08             | 25                 |

Tables 4.4(a) and 4.4(b) show that, according to CBOs all the criteria on social sustainability of two water supply systems are not up to the set level of 75. Both CBOs do not make any attempt to arrange meetings frequently to hear the voices of their consumers on O&M issues or any other matters related to the water supply system activities. Actions taken to inform to consumers on major repairs/breakdowns in advance, actions taken to building of sense of ownership among users and getting help for common O&M activities also failed in both systems. Those are directly affecting the social sustainability of the system.

The main social issue in Kirimetiyan water supply system is that some of the consumer groups are not supporting the CBO on management issues of water supply system, because they have cast disparity between other groups. This matter was not addressed even during the project implementation phase and it is badly affecting the O&M phase too. Main social problem in Sliyawewa water supply system is that two groups in different geographical areas are not willing to work together.

Total average scores for social sustainability in two systems are far below the accepted score of 75 in views of both households and CBOs.

**Table 4.5(a): Comparison on financial sustainability of two water supply systems in dry district based on household survey**

| Sustainability factor                           | Saliyawewa WSS | Kirimetiyan WSS |
|---|----------------|-----------------|
| 1. Affordability                                | 44             | 41              |
| 2. Willingness to pay                           | 50             | 50              |
| 3. Accuracy of billing information              | 90             | 87              |
| 4. Familiarity of payment system                | 93             | 86              |
| 5. Up dating of billing information             | 87             | 89              |
| 6. Encouraging to use of water saving apparatus | 37             | 40              |
| Overall social                                  | 67             | 66              |

**Table 4.5(b): Comparison on financial sustainability of two water supply systems in dry district based on CBO survey**

| Sustainability factor  | Saliyawewa WSS | Kirimetiyan WSS |
|--|----------------|-----------------|
| 1. Collection efficiency   | 100            | 50              |
| 2. Annual auditing   | 100            | 50              |
| 3. Actions taken to encourage consumers to install of water saving apparatus | 00             | 00              |
| Overall financial  | 67             | 33              |



In Saliyawewa water supply system, all the criteria associated with the billing and collection activities such as accuracy of billing information, familiarity of payment system, updating of billing information, collection efficiency in two water supply systems meet the minimum required level of 75 in views of both CBO and households. In addition to that, the annual auditing has been done for last two years in Saliyawewa water supply system. But Kirimetiyanana water supply system has failed to conduct annual auditing of their accounts for last two years. The most important criterion on financial sustainability of water supply systems is affordability of tariff and willingness to pay of water consumers. According to the survey results, both criteria are not up to the threshold value of 75 in two water supply systems. Main reason for this is high water tariff in these two water supply systems due to high electricity consumption for the two-stage pumping system. Low income of the people in the area has also affected the above criteria.

Scores of overall financial sustainability for both systems are not meeting the minimum required level of 75 according to both households and CBOs.

**Table 4.6(a): Comparison on environmental sustainability of two water supply systems in dry district based on household survey**

| Sustainability factor                          | Saliyawewa WSS | Kirimetiyanana WSS |
|--|----------------|--------------------|
| 1.Catchments preservation activities by CBO    | 69             | 68                 |
| 2.Cleanness in treatment plant, reservoir etc. | 79             | 70                 |
| 3.Management waste around water points/sources | 76             | 69                 |
| Overall environmental                          | 75             | 69                 |

**Table 4.6(b): Comparison on environmental sustainability of two water supply systems in dry district based on CBO survey**

| Sustainability factor   | Saliyawewa WSS | Kirimetiyanana WSS |
|---|----------------|--------------------|
| 1.Actions taken to preserve catchments                                  | 75             | 50                 |
| 2.Keeping clean environment in treatment plant site, reservoir site etc | 75             | 75                 |
| 3.Actions taken to manage waste around water points/sources             | 75             | 50                 |
| Overall environmental   | 75             | 58                 |

Tables 4.6(a) and 4.6(b) show that the actions taken to preserve catchments of water source in Saliyawewa water supply system is up to required score of 75 according to CBO, but corresponding score in household view is 69. The scores for actions taken to

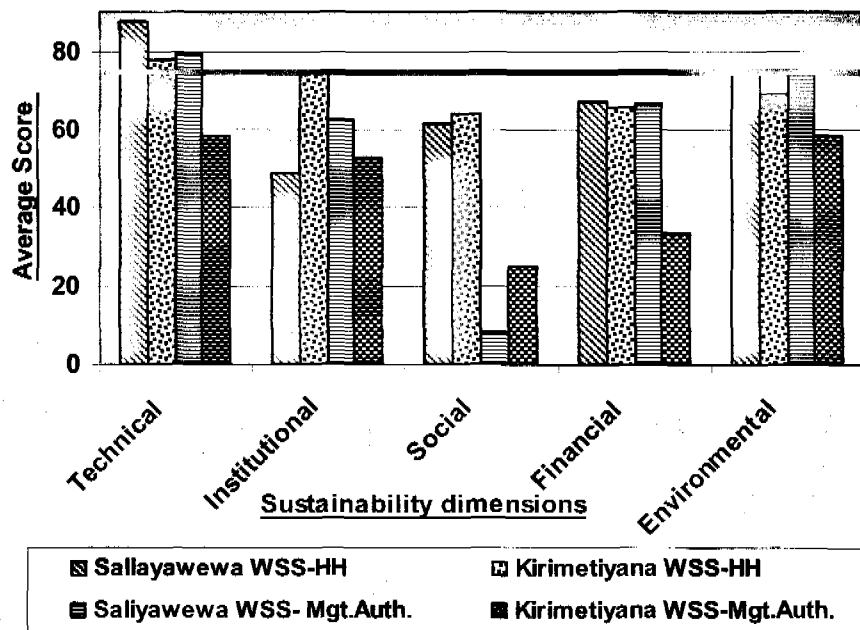
preserve catchments of water source in Kirimetiya are 68 and 50 for household and CBO respectively. Reason for the high scores for Saliyawewa water supply system are the surface water source can clearly identified the catchment area and the catchment preservation program launched by CBO with the help of government and non government organizations. But it is difficult to identify the catchment area of water source in Kirimetiya water supply system, because the raw water source for the water supply system is ground water deep well. Therefore CBO does not have clear program for preservation of the catchment.

Keeping clean environment at treatment plant site and reservoir site are at acceptable level of 75 in both water supply systems except in view of households in Kirimetiya water supply system. Scores for the actions taken to manage waste around water points/sources meets the minimum required level of 75 at Saliyawewa water supply system but in Kirimetiya water supply system scores are 69 and 50 according to households and CBO respectively which are both below the threshold value of 75.

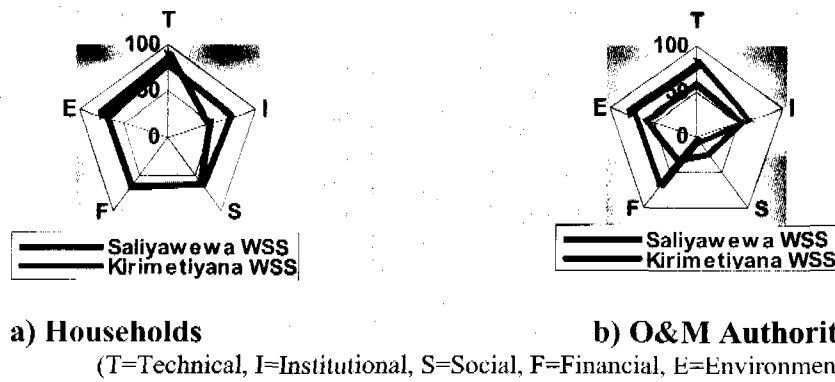
Overall environmental sustainability scores in Saliyawewa water supply system meets the required level of 75 but it is below in Kirimetiya water supply system.

**Overall comparison of sustainability dimensions in dry district**

Figures 4.17 and 4.18 show the comparison of sustainability dimension scores for two water supply systems in the views of both households and CBOs.



**Figure 4.17: Comparison of two water supply systems in dry district on sustainability dimensions**



**Figure 4.18: Sustainability diamonds as expressed by Households and O&M Authority for two water supply system in dry district**

Figures 4.17 and 4.18 show that scores for institutional, social and financial dimensions do not meet the required level of 75 in two water supply systems. But technical and environmental dimensions meet the threshold value of 75 for both water supply systems.

According to the CBOs in both systems the scores for social aspect are far below the acceptable level. This is an important issue to consider because, two systems are socially not accepted according to their own ideas. The other important matter is low score in Krimetiyana water supply system for financial dimension in the view of CBO. This issue should also to be rectified immediately for the reason that trust of consumers is mainly dependent on financial matters of CBO. In general the above comparison shows that Saliyawewa water supply system is better than Krimetiyana water supply system in all sustainability aspects.

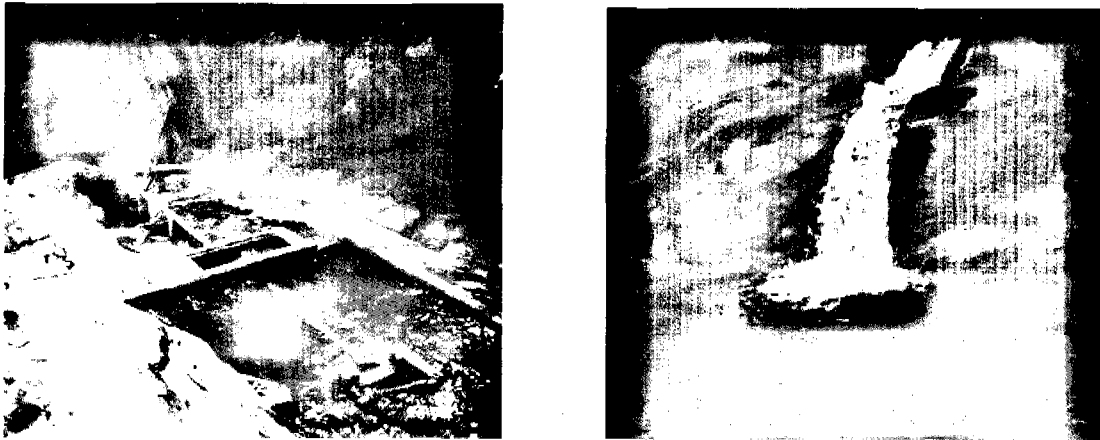
#### 4.5 Analysis of selected water supply systems in wet districts

This section presents short description of two selected small town water supply systems from wet district and analysis on project implementation, institutional arrangement, backup support system and overall sustainability.

##### 4.5.1 Description selected water supply systems

###### Kitulgala water supply system

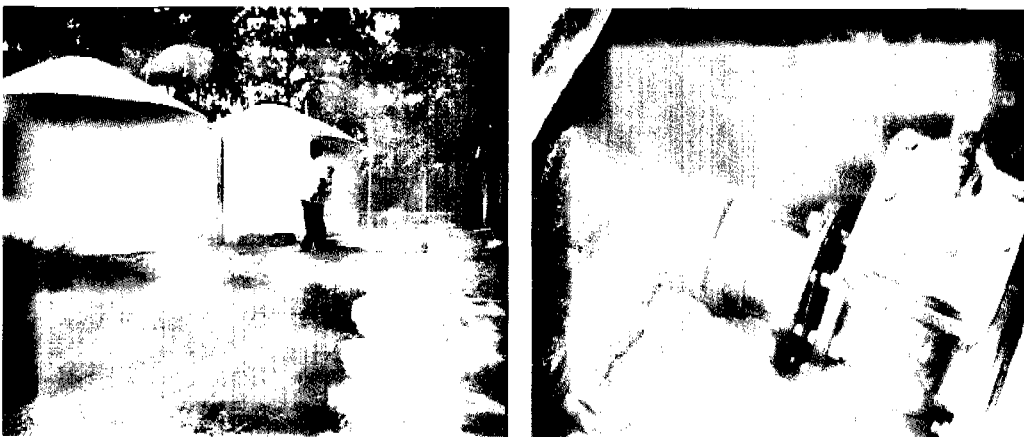
Kitulgala water supply system is a gravity flow water system and it is located in Kegalle district in wet zone of the Sri Lanka. The water source for the system is “Liyanoya” stream which is about 5 km away from the town center. The intake is a concrete dam constructed across the stream and water is gravitated to three ferro-cement tanks through 3.5 km long 200 mm diameter GI/DI gravity main. The only treatment facility available is chlorination for disinfection. After the chlorination at reservoir site water is distributed to about 2800 people through 560 metered water connections. The O&M authority of the water supply system is a community based organization (CBO) called “Liyanoya Development Foundation”.



**Figure 4.19: Intake structure and water source of Kitulgala water supply system**

#### Dedigama water supply system

The second selected water supply system from wet district is Dedigama water supply system and it is also situated in the Kegalle district in wet zone of Sri Lanka. Two deep bore holes are the water source for the Dedigama water supply system and the total yield of boreholes are 560 cubic meters per day. Chlorination is the only treatment facility in this water supply system. Water is directly pumped to the ferro-cement ground reservoirs constructed in higher elevation and after chlorination it is supplied to the distribution area. Number of connections in this water supply system is 560 and all the connections are metered. Direct beneficiaries are about 2600. This water supply system is also managed by a CBO named "Parakumba Development Foundation".



**Figure 4.20: Ferro-cement reservoirs and borehole intake of Dedigama water supply system**

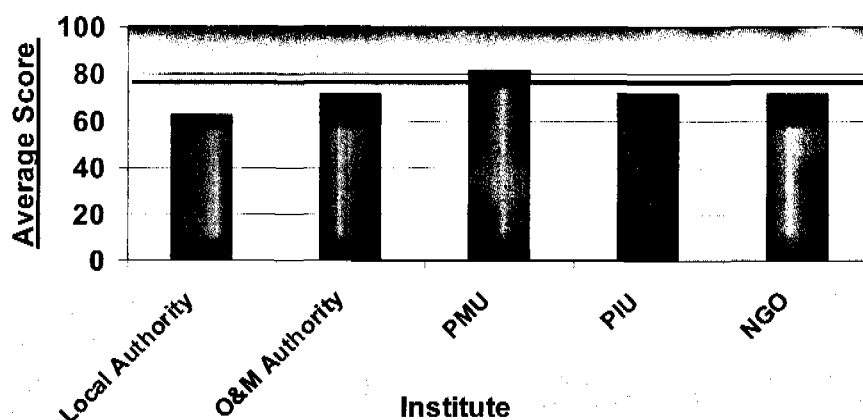
#### *4.5.2 Analysis on project implementation*

Organizations that participated for the evaluation of the project implementation arrangement in the above water supply systems are local authorities, CBOs, project management unit, project implementation unit and NGOs. Analysis was done with the interviews based on the relevant questionnaires included in Annexes A.2, A.3, A.4, A.5 and A.6. In total of 36 persons were interviewed to evaluate the project implementation

aspects for two small town water supply systems. Assessment and scoring was done based on the criteria mentioned in tables 3.5 and 3.2 respectively.

#### Kitulgala water supply system

Results of the survey in Kitulgala water supply system in wet district on project implementation are shown in figure 4.21. It presents the average scores obtained by each agency on different related questionnaires. Detail calculations and scores are in Annex E.

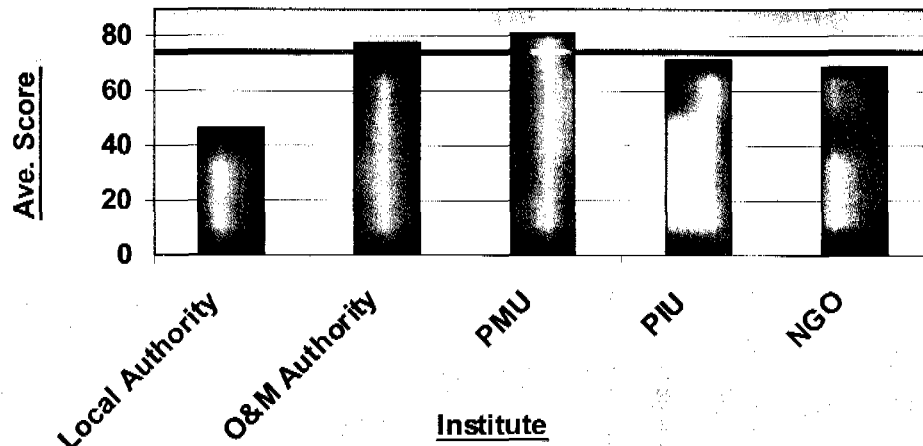


**Figure 4.21: Survey results on project implementation in Kitulgala water supply system**

Figure 4.21 shows that, according to the project management unit the score for project implementation is above the threshold value of 75. In views of NGO, project implementation unit and CBO the score is 72 and local authority score is 63 which are all below the acceptable level. As expected the project management unit has scored it above the acceptable value of 75, because they are the key implementer of the project. Selections criteria for NGO and small town are not up to the desires of local authority. These are the reason for not meeting the set criteria of 75. The score given by NGO also dose not meet the minimum required level because, they did not get enough freedom on project activities and the project handing over process was not up to their expectation as in dry district. Furthermore, the CBO score is below the acceptable level of 75 on project implementation process, the reason is: they are not pleased on construction process because some of the works done by contractors are not up to standards.

#### Dedigama water supply system

Figure 4.22 shows the survey results (average scores) of the Dedigama water supply system in wet district on project implementation which was acquired using different related questionnaires in Annex A. Detail calculations and scores are included in Annex E.



**Figure 4.22: Survey results on project implementation in Dedigama water supply system**

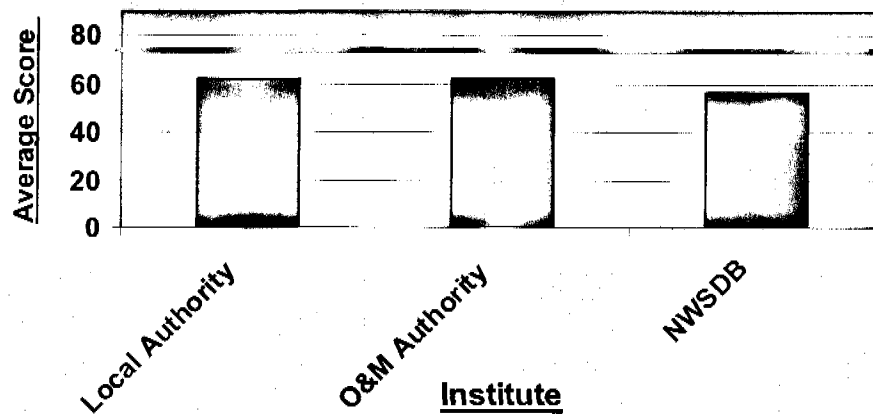
Scores for the project implementation process are 47, 69 and 72 according to local authority, NGO and project implementation unit respectively in Dedigama water supply system which is all below the acceptable level of 75. In the views of the project management unit and CBO the scores are 81 and 78 respectively which are above threshold level. The reasons described in earlier section are valid for the project management unit for Dedigama water supply system as implementer. CBO score is above 75, because they received frequent support from project implementation unit and NGO for the implementation process. The reason for getting more support than in case of other small water supply systems is project implementation unit and NGO offices are situated very close to the Dedigama small town. Local authority score is below the acceptable level due to poor coordination of NGO and method used to enter to the community in small town area is not up to their expectations. The NGO score is also not meeting the minimum required level, because they are not satisfied on the procedure used to enter the community.

#### 4.5.3 Analysis on institutional arrangement

Institutions engaged on this analysis were relevant local authority, CBOs and NWSDB regional office and relevant questionnaires in Annexes A.2, A.4 and A.7 were used for the assessment on the institutional arrangement. Evaluation was done as explained in the section 4.5.2. As mentioned in earlier section, same officers from each institution participated in the evaluation process. All together 24 persons were involved for two small town water supply systems. The assessment and scoring was done based on the criteria mentioned in tables 3.6 and 3.2 respectively.

#### Kitulgala water supply system

Results of the survey in Kitulgala water supply system in wet district on institutional arrangement are shown in figure 4.23. It shows the average scores given by each agency on different related questionnaires in Annex A. Detail calculations and score are in Annex E.

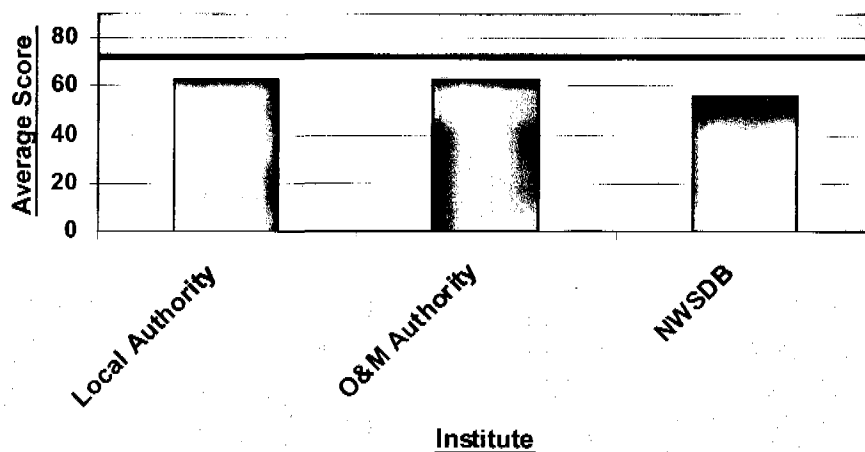


**Figure 4.23: Survey results on institutional arrangement in Kitulgala water supply system**

Figure 4.23 shows that the scores are below the acceptable score of 75 on institutional arrangement in Kitulgala water supply system according to all institutions. One of the main reasons for the above results is that the CBO does not meet frequently. Hence they do not work as a group. The CBO depends only on the chairman's activities and his decisions. It is badly affecting the sustainability of the system, because the CBO members and the executive committee members are not playing active role within their organization.

#### Dedigama water supply system

Figure 4.24 shows the average scores given by each institution for the Dedigama water supply system in wet district on institutional arrangement using different related questionnaires in Annex A. Detail calculations and scores included in Annex E.



**Figure 4.24 Survey results on institutional arrangement in Dedigama water supply system**

All the scores are below the threshold value of 75 as in case of Kitulgala water supply system results in the views of all institutions. This is mainly due to poor record keeping

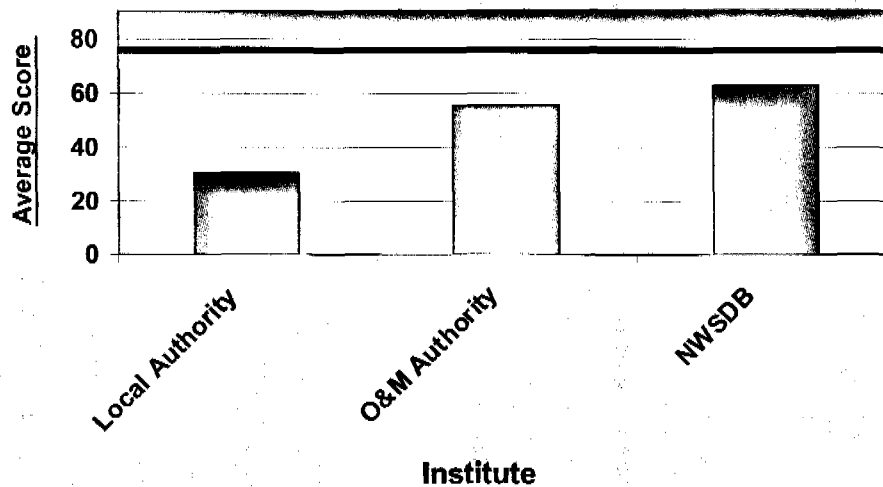
in accounts and stores within the organization. It shows the lack of management skill in CBO officers. Hence consumers and executive committee do not trust O&M authority (CBO) key officers and it is directly affecting the sustainability of the system. The other reason for scores below the acceptable score is low population coverage from the water supply system.

#### 4.5.4 Analysis on backup support system

The assessment on backup support system was done using the relevant questionnaires in Annexes A.2, A.4 and A.7. The analysis is similar to the assessment of institutional arrangement. Institutions engaged and number of officers that participated from each institution was also same. Evaluation and scoring was done based on the criteria mentioned in tables 3.7 and 3.2 respectively.

#### Kitulgala water supply system

Results of the survey in Kitulgala water supply system in wet district on backup support system are shown in figure 4.25. It shows the average scores given by each institute on different related questionnaires in Annex A. Detail calculations and score are in Annex E.



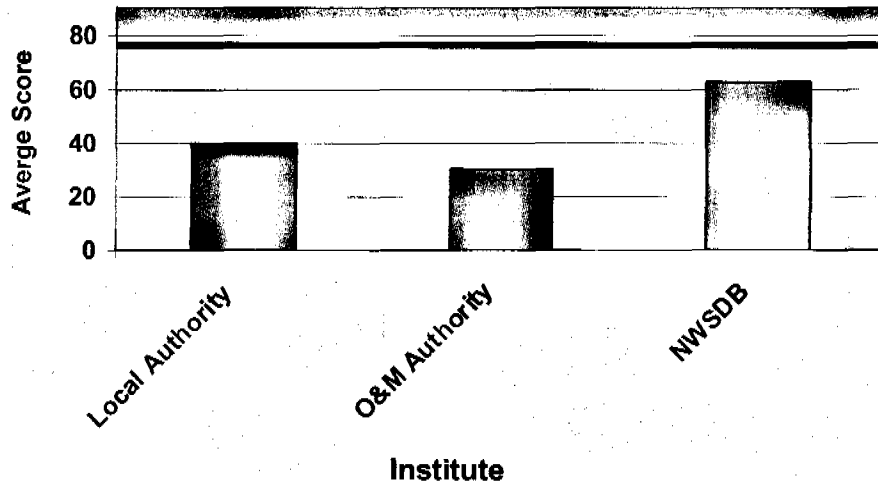
**Figure 4.25: Survey results backup support system in Kitulgala water supply system**

Figure 4.25 shows that all the scores for backup system in Kitulgala water supply system are below the acceptable score of 75 according to all institutions. For the above results, the poor coordination among all institution is the main reason as in dry district. This is again due to negligence of responsibilities mentioned in tripartite agreement (Annex F) signed between local authority, management authority and NWSDB. This agreement was signed to strengthen coordination among all three institutions for continued support to CBO for smooth operations of water supply systems. The mechanism for coordination among three institutions is also clearly indicated in the agreement, but it has been neglected specially by the local authority.



### Dedigama water supply system

Figure 4.26 shows the survey results (average scores) of the Dedigama water supply system in wet district on backup support system which was obtained using different related questionnaires in Annex A. Detail calculations and scores included in Annex E.



**Figure 4.26: Survey results on backup support system Dedigama water supply system**

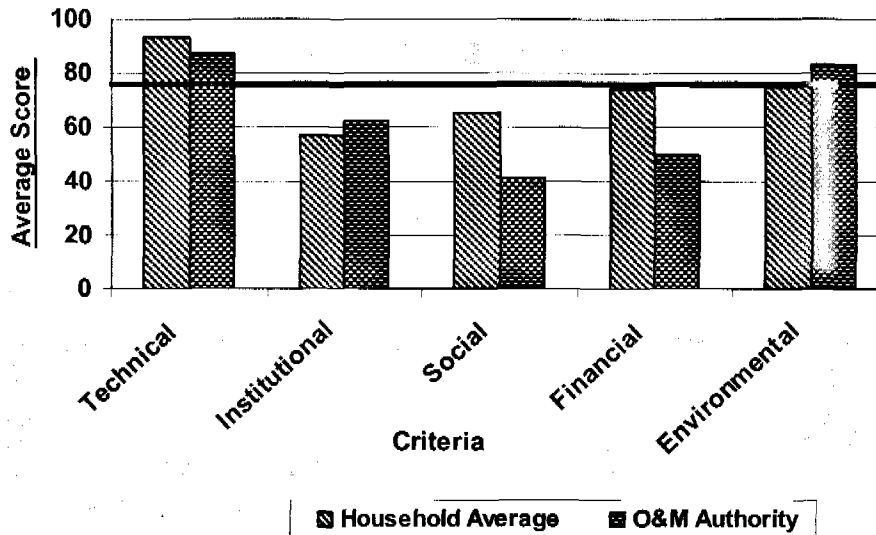
Figure 4.26 also depicts the lower scores as in Kitulgala water supply system on backup support system according to all three institutions. The main reasons underlying the poor backup support is the negligence of local authority on tripartite agreement (Annex F) as explained in the Kitulgala water supply system.

#### *4.5.5 Analysis on sustainability dimensions*

The procedure for evaluation of sustainability dimension is same as explained in section 4.3.5. For the analysis, randomly selected 25 beneficiary households and the officers of CBOs of the water supply systems were interviewed. Chairmen, secretaries, three executive members of CBO and caretakers also participated as in dry district. In total 62 persons were involved in evaluation process on sustainability dimensions for two small town water supply systems. Results of the analysis are compared as observation of households and CBOs. The evaluation was done using the relevant questionnaires in Annex A.1 and A.2 and analysis was done based on the criteria mentioned in table 3.3 and 3.4 for households and for CBOs respectively. The scoring was done as per the table 3.2.

### Kitulgala water supply system

Average scores of the survey of sustainability dimensions for Kitulgala water supply system is shown in the figure 4.27. Results are based on the different related questionnaires in Annex A and related calculations presented in the Annex E.

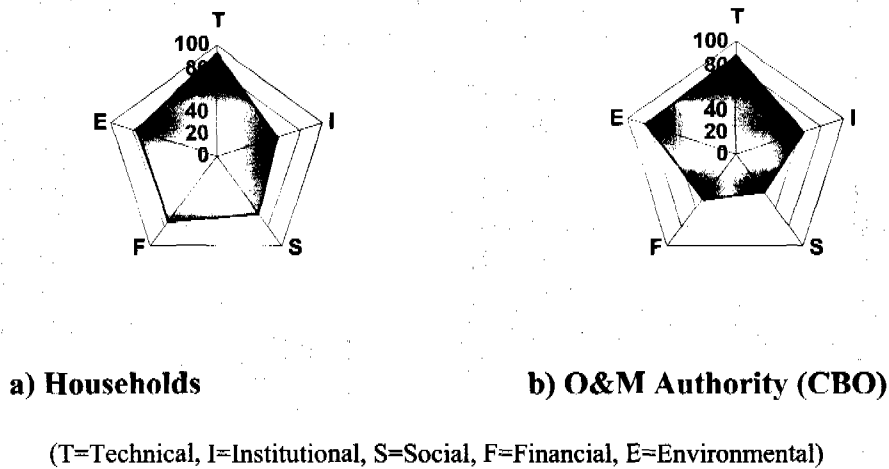


**Figure 4.27: Survey results on sustainability dimensions in Kitulgala water supply system**

Average scores for technical aspects are 93 and 88 in the view of beneficiaries and CBO respectively. Environmental sustainability scores are 75 and 83 for beneficiaries and CBO respectively. This shows scores of both parties are in acceptable level in technical and environmental sustainability dimensions. However scores for the institutional, social and financial dimensions do not meet the minimum required level of 75.

Water quality, water quantity, residual pressure, distance to water points and system losses are within appropriate range. This is the reason to meet acceptable level on technical dimension in views of both households and CBO. The environmental dimension is also at the reasonable level, because CBO is launching catchments preservation program with other agencies such as government and NGOs and water points and treatment plants are kept clean. The institutional, social and financial dimensions show poor rating due to less coverage, no transparency on CBO accounts, executive committee and general members are not meeting regularly, less number of women representation in executive committee, poor record keeping on stores, breakdowns and repairs, and consumer complains.

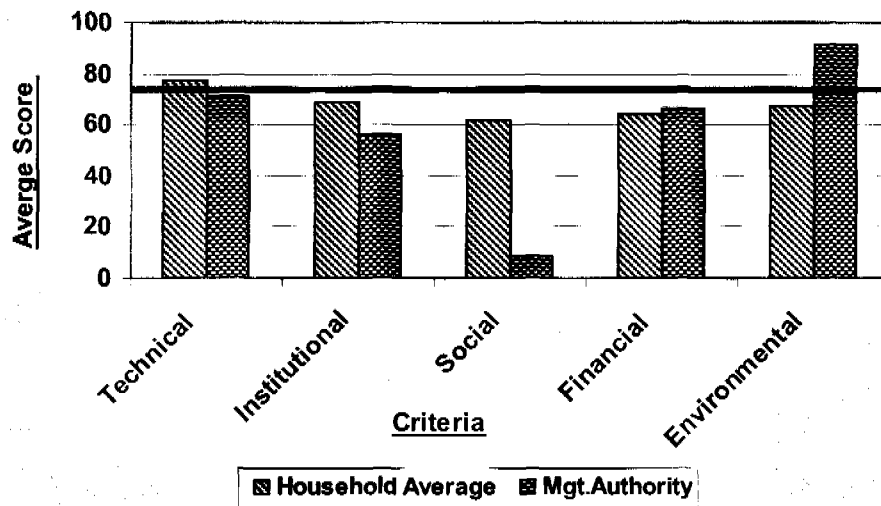
The average overall sustainability scores for household and O&M authority (CBO) are 73 and 65 respectively which are below the acceptable value of 75. The sustainability diamonds for both are presented in figure 4.28. Comparison of sustainability diamonds show that compared to CBO, households view the water supply system to be more sustainable.



**Figure 4.28: Sustainability diamonds as expressed by Household and O&M Authority for Kitulgala water supply system**

Dedigama water supply system

Results of the survey of Dedigama water supply system in dry district on sustainability dimensions are shown in figure 4.29. It shows the average scores given by each agency on different related questionnaires in Annex A and detail calculations and scores are presented in Annex E.



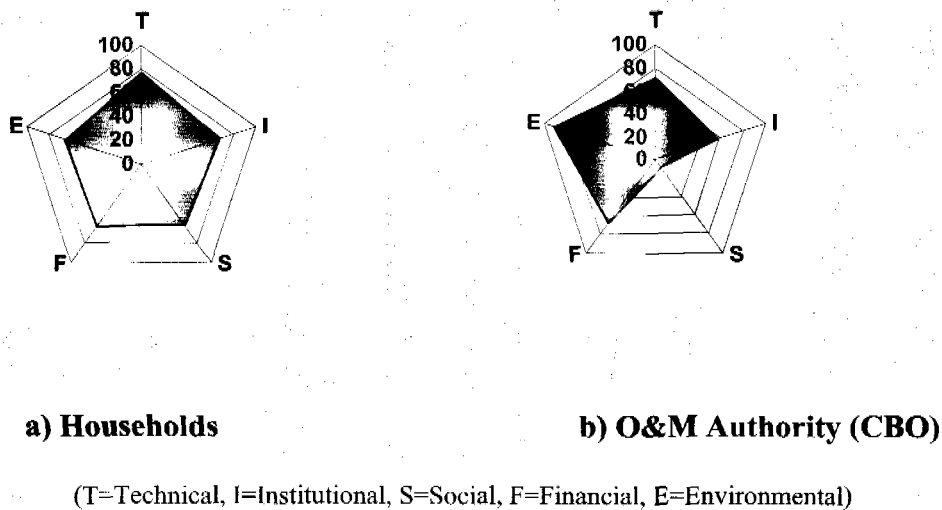
**Figure 4.29: Survey results on sustainability dimensions in Dedigama water supply system**

In view of households the score for technical sustainability dimension is 78 which is above the acceptable level. The household level scores for the institutional, social, financial and environmental dimensions are 69, 62, 64 and 67 respectively, all of which are not up to set criteria of 75. However scores of the CBO do not meet the minimum required level in all sustainability dimensions except environmental aspects of the water supply system. Reasons for the satisfaction on technical dimension of households are same as explained in the earlier section and reasons for the dissatisfaction of

institutional social and financial dimensions also same as mentioned in the same section. The environmental dimension is below the threshold value due to some of the action taken by CBO for catchments preservation is not up to the satisfaction of consumers.

In the view of CBO, sustainability dimensions in water supply system do not meet the set criteria of 75 because, water quality is deteriorated due to presence of some iron, frequent pipe bursts in some small distribution lines, water quality examination is not done in regular basis, no record keeping in stores for meters and other daily needed items, no regular meetings within the CBO and consumers, and no idea about non revenue water component of the system.

Figure 4.30 shows the sustainability diamonds for both household and O&M authority (CBO) and average overall sustainability scores are 68 and 59 respectively which are below the threshold value of 75. As in case of other water supply system, in this case also household rate the system as more sustainable while CBO view the system very weak in financial, institutional and social dimensions.



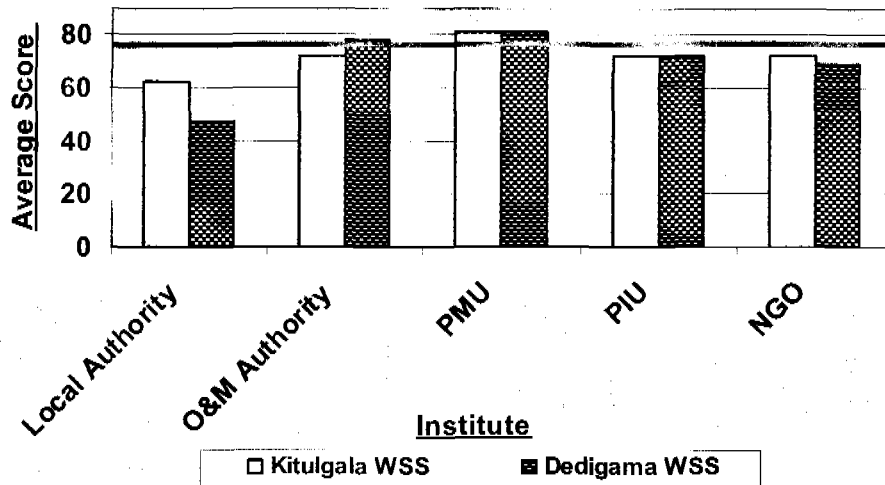
**Figure 4.30: Sustainability diamonds as expressed by Household and &M Authority for Dedigama water supply system**

#### 4.6 Comparison of two small town water supply systems in wet district

Comparison of two water supply systems in wet district was also done as in case of the dry district on the basis of their respective average scores on project implementation, institutional arrangement, backup support system and sustainability dimensions.

##### 4.6.1 Comparison of project implementation

The two small town water supply systems in wet district were compared on project implementation and results shown in the figure 4.31

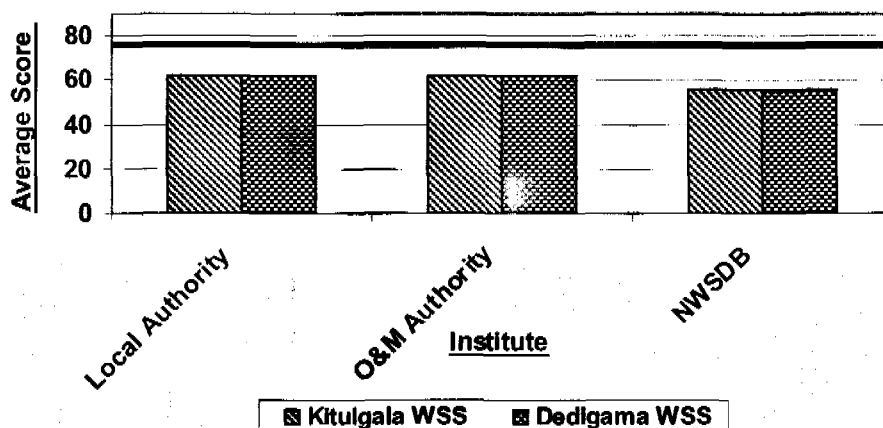


**Figure 4.31: Comparison of two small town water supply systems in wet district on project implementation**

Comparison shows that according to local authorities, CBOs, project implementation unit and NGOs project implementation do not meet score of the minimum required level of 75 except in the view of Dedigama CBO. But the score of project management unit is 82. As mentioned earlier both local authorities noticed the weaknesses of project implementation process such as selections criteria for NGO and small town not up to desired level, and the method used to enter to the community in small town area are the reasons for not meeting the set criteria. The poor coordination of selected NGO is the other reason for low scores in the views of local authorities. Both NGOs scores are also not up to the set criteria of 75 as they did not get much freedom for project activities, the project handing over process was not up to their expectation as in dry district in project implementation phase. As usual project management unit scores are above the threshold value on both systems, because they are the implementers.

*4.6.2 Comparison of institutional arrangement*

A comparison of the results of institutional arrangement for two water supply systems in wet district is shown in the figure 4.32.

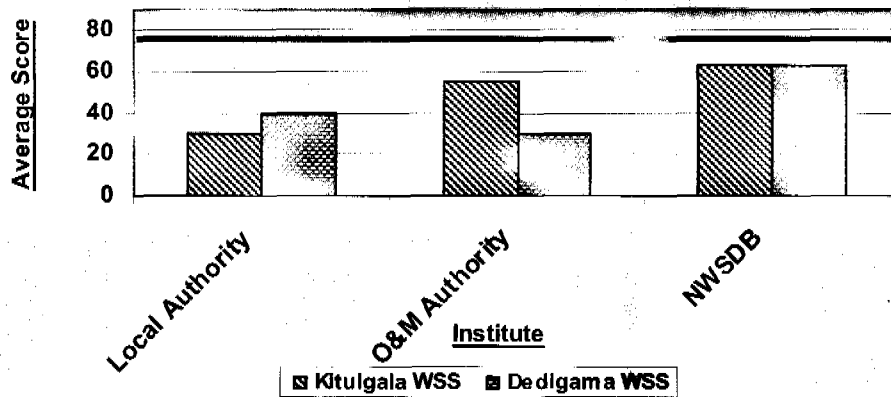


**Figure 4.32: Comparison of two small town water supply systems in wet district on institutional arrangement**

Figure 4.32 shows that according to local authority, CBOs and NWSDB present institutional arrangement do not meet the minimum required value of 75 for two water supply systems. Main reason for these results is two CBOs do not meet frequently therefore, they cannot take decisions on behalf of consumers. Poor record keeping in accounts and stores within organizations are also causes for the scores below threshold value. Hence consumers and other members of executive committee do not have confidence on key officers of CBOs.

#### 4.6.3 Comparison of backup support system

Figure 4.33 shows the comparison of two small town water supply systems in wet district on backup support system.



**Figure 4.33: Comparison of two small town water supply systems in wet district on backup support system**

Above figure shows that in the views of local authority, CBOs and NWSDB regional office present backup support system are not meeting the minimum required level of 75 for both water systems. This was due to poor coordination mechanism among all institutions and negligence of responsibilities in tripartite agreement of NWSDB and local authorities as described in dry district.

#### 4.6.4 Comparison of sustainability dimensions

Evaluation of technical, institutional, social, financial and environmental dimensions was done based on the average scores given by household and management authorities on different related questionnaires in Annex A.1 and A.2 in two water supply systems. Results of two water supply systems for each sustainability dimension were compared separately and presented in tables 4.7 to 4.11

**Table 4.7(a): Comparison on technical sustainability of two water supply systems in wet district based on household survey**

| Sustainability factor       | Kitulgala WSS | Dedigama WSS |
|-----------------------------|---------------|--------------|
| 1. Water quality            | 95            | 32           |
| 2. Water quantity           | 94            | 94           |
| 3. Accesability             | 100           | 100          |
| 4. Reliability              | 85            | 62           |
| 5. Duration of water supply | 95            | 90           |
| 6. Residual pressure        | 89            | 85           |
| Overall technical           | 93            | 77           |

**Table 4.7(b): Comparison on technical sustainability of two water supply systems in wet district based on CBO survey**

| <b>Sustainability factor</b>        | <b>Kitulgala WSS</b> | <b>Dedigama WSS</b> |
|-------------------------------------|----------------------|---------------------|
| 1. Water quality                    | 75                   | 50                  |
| 2. Actions to rectify water quality | 100                  | 100                 |
| 3. Water quantity                   | 100                  | 50                  |
| 4. Water pressure                   | 75                   | 50                  |
| 5. Monitoring of NRW                | 100                  | 75                  |
| 6. Frequency of supply              | 100                  | 100                 |
| Overall technical                   | 92                   | 71                  |

Tables 4.7(a) and 4.7(b) show that the scores obtained on water quality parameter in Kitulgala water supply system are 95 and 75 and Dedigama water supply system are 32 and 50 for household and CBO survey respectively. Presence of iron in deep boreholes of Dedigama water supply system is the main reason for low scores. Water source for Kitulgala water supply system is a non polluted stream therefore, water quality is good even without any treatment. Both systems have not checked other physical water quality parameters of raw and distributed water for last two years. But bacteriological test for distributed and raw water was done in regularly on monthly basis. Other technical aspects like water quantity, accessibility, reliability, duration of water supply and residual pressure in both water supply systems meet the threshold value of 75 in household survey except reliability of water supply in Dedigama water supply system.

In view of CBO, all technical aspects namely water quality, actions taken to rectify water quality, water quantity, water pressure, monitoring of NRW, frequency of supply in Kitulgala water supply system are above the set criteria of 75. In Dedigama water supply system the technical aspects namely actions taken to rectify water quality, monitoring of NRW and frequency of supply obtained scores of 100, 75 and 100 respectively. Other parameters namely water quality, water quantity and water pressure are below the set criteria. The reasons for getting of low scores are frequent interruptions of small pipes in distribution system and presence of iron and no treatment facility to reduce the iron content.

Overall technical sustainability scores are above the acceptable value of 75 for both systems in the views of households and CBOs.

**Table 4.8(a): Comparison on institutional sustainability of two water supply systems in wet district based on household survey**

| Sustainability factor             | Kitulgala WSS | Dedigama WSS |
|-----------------------------------|---------------|--------------|
| 1.Community involvement           | 69            | 90           |
| 2.Formation of CBO                | 67            | 67           |
| 3.Gender balance                  | 34            | 65           |
| 4.Frequency of meetings of CBO    | 53            | 69           |
| 5.Transparency in accounts of CBO | 59            | 52           |
| 6.Regulations for O&M             | 62            | 69           |
| Overall institutional             | 53            | 69           |

**Table 4.8(b): Comparison on institutional sustainability of two water supply systems in wet district based on CBO survey**

| Sustainability factor             | Kitulgala WSS | Dedigama WSS |
|-----------------------------------|---------------|--------------|
| 1.Coverage                        | 50            | 75           |
| 2.Attending to consumer complains | 100           | 100          |
| 3.Record keeping                  | 75            | 50           |
| 4.Frequency of meetings of CBO    | 50            | 50           |
| 5.Transparency in accounts of CBO | 50            | 00           |
| 6.Billing and collection          | 75            | 75           |
| 7.Regulations for O&M             | 75            | 75           |
| 8.Gender balance                  | 25            | 25           |
| Overall institutional             | 63            | 57           |

Based on household survey in Kitulgala water supply system all the aspects in institutional sustainability scores are not meeting the set criteria of 75 according to households. As per the CBO attending to consumer complains, record keeping, billing and collection, and regulations for O&M parameters are above the acceptable level. However coverage, frequency of CBO meetings, transparency of accounts and gender balance are below the accepted level. The main issues in this water supply system are that the CBO does not meet regularly and most of decisions taken by chairman alone.

The Dedigama water supply system does not meet most of the institutional sustainability aspects to acceptable level of 75 except community involvement in view of households. Coverage, attending to consumer complains, billing and collection and regulations for O&M meet the minimum required level of 75 in view of CBO. Poor record keeping, no transparency in accounts of CBO and no regular meetings are the main issues in this water supply system on institutional sustainability.

According to households as well as CBOs overall institutional sustainability scores are below the threshold value of 75 for both systems.



**Table 4.9(a): Comparison on social sustainability of two water supply systems in wet district based on household survey**

| Sustainability factor                    | Kitulgala WSS | Dedigama WSS |
|--|---------------|--------------|
| 1.Sense of ownership                     | 74            | 87           |
| 2.Arrangement of general meetings        | 69            | 50           |
| 3.Informing of major repairs/breakdowns  | 78            | 72           |
| 4.Getting help for common O&M activities | 39            | 37           |
| Overall social                           | 65            | 62           |

**Table 4.9(b): Comparison on social sustainability of two water supply systems in wet district based on CBO survey**

| Sustainability factor   | Kitulgala WSS | Dedigama WSS |
|---|---------------|--------------|
| 1.Frequency of meetings with consumer   | 25            | 00           |
| 2.Actions taken to inform to consumers on major repairs/breakdowns in advance | 75            | 25           |
| 3. Actions taken to building of sense of ownership among users.               | 25            | 00           |
| Overall social  | 42            | 08           |

The results of survey shows that the informing of major repairs/breakdowns is the only social aspect of Kitulgala water supply system that meets the set criteria of 75 in household view. The other aspects namely actions taken to build sense of ownership among members, arrangement of general meetings and getting help for common O&M activities are below the acceptable level also in the view of households. Frequencies of meetings with consumer and actions taken to build the sense of ownership obtained score 25 which is far below the acceptable level in CBO results. This is because CBO do not attempt to organize frequent meetings with consumer on O&M issues and even they do not meet frequently to discuss matters related to the water supply system activities. This is badly affecting the sense of ownership among users. Dedigama water supply system also obtained scores closer to Kitulgala water supply system because, the similar situation prevails in Dedigama water supply system as in Kitulgala water supply system.

The overall scores of social sustainability is less than 75 for both systems in the view of both households and CBO.

**Table 4.10(a): Comparison on financial sustainability of two water supply systems in wet district based on household survey**

| Sustainability factor                         | Kitulgala WSS | Dedigama WSS |
|---|---------------|--------------|
| 1. Affordability                              | 90            | 31           |
| 2. Willingness to pay                         | 75            | 70           |
| 3. Accuracy of billing information            | 76            | 75           |
| 4. Familiarity of payment system              | 86            | 88           |
| 5. Up dating of billing information           | 69            | 75           |
| 6. Encouraging to use of water saving devices | 48            | 44           |
| Overall financial                             | 74            | 64           |

**Table 4.10(b): Comparison on financial sustainability of two water supply systems in wet district based on CBO survey**

| Sustainability factor  | Kitulgala WSS | Dedigama WSS |
|--|---------------|--------------|
| 1. Collection efficiency   | 50            | 100          |
| 2. Annual auditing   | 100           | 100          |
| 3. Actions taken to encourage consumers to install of water saving devices | 00            | 00           |
| Overall financial  | 50            | 67           |

Tables 4.10(a) and 4.10(b) show that the scores of affordability, willingness to pay, accuracy of billing information and familiarity of payment system are 90, 75, 76 and 86 respectively in views of households in Kitulgala water supply system. Main reason for getting high scores for these aspects is that the tariff is low as this is a gravity flow water supply system. Hence there is no need of energy to operate the system. Due to lack of management skills in CBO, the updating of billing information and encouraging to use of water saving apparatus obtained low scores of 69 and 48 respectively again in households views. According to the CBO of Kitulgala water supply system, the survey results are 50 and 00 in collection efficiency and actions taken to encourage consumers to install of water saving apparatus respectively which are below the acceptable level of 75. The score for annual auditing is above the acceptable level.

In household point of view, the Dedigama water supply system scores for affordability, willingness to pay and actions taken to encourage consumers to install of water saving devices are 31, 70 and 44 respectively which are below the acceptable level of 75. Accuracy of billing information, familiarity of payment system and up-dating of billing information meet the minimum required level of 75 in view of households. Water tariff in Dedigama water supply system is high due to energy cost for pumping of water. This is the main reason for getting low scores for affordability and willingness to pay. High

scores for annual auditing and collection efficiency from CBO and activities in billing procedures from households are show the better management skill of Dcdigama CBO than Kitulgala CBO.

In general, overall financial sustainability scores in both water supply systems not meet the required level of 75.

**Table 4.11(a): Comparison on environmental sustainability of two water supply systems in wet district based on household survey**

| Sustainability factor                          | Kitulgala WSS | DedigamaWSS |
|--|---------------|-------------|
| 1.Catchments preservation activities by CBO    | 67            | 33          |
| 2.Cleanness in treatment plant, reservoir etc. | 75            | 71          |
| 3.Management waste around water points/sources | 83            | 97          |
| Overall environmental                          | 75            | 67          |

**Table 4.11(b): Comparison on environmental sustainability of two water supply systems in wet district based on CBO survey**

| Sustainability factor   | Kitulgala WSS | DedigamaWSS |
|---|---------------|-------------|
| 1.Actions taken to preserve catchments                                  | 100           | 75          |
| 2.Keeping clean environment in treatment plant site, reservoir site etc | 75            | 100         |
| 3.Actions taken to manage waste around water points/sources             | 75            | 100         |
| Overall environmental   | 83            | 92          |

Tables 4.11(a) and 4.11(b) show that in view of households the scores for the actions taken to preserve catchments of water source in Kitulgala water supply system and Dedigama water supply system are 67 and 33 respectively which are below acceptable score of 75, but these scores in CBO view are 100 and 75 respectively. The reason behind the difference in views between households and CBO is less awareness of households on actions taken to preserve catchments by CBO with the help of NGOs and government organizations.

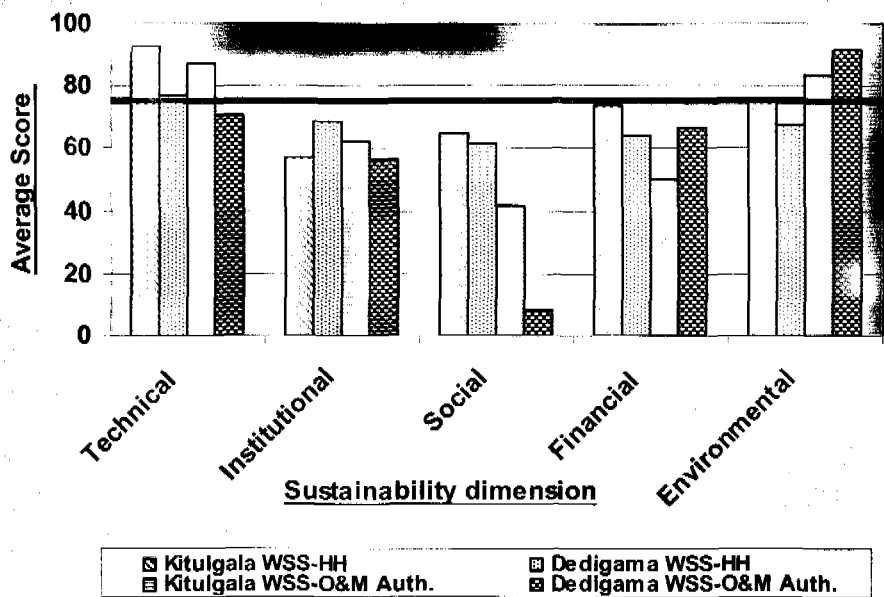
According to households, sustainability aspects like keeping clean environment at water treatment plant site and at reservoir site are at acceptable level of 75 in Kitulgala water supply system but in Dedigama water supply system it is 71. CBOs have the views that for these aspects are above the minimum required level of 75 for both water supply

systems. Scores for the actions taken to manage waste around water points/sources meets the acceptable level of 75 in two water supply systems according to both households and CBOs. This was due to the effectiveness of caretakers on their duties.

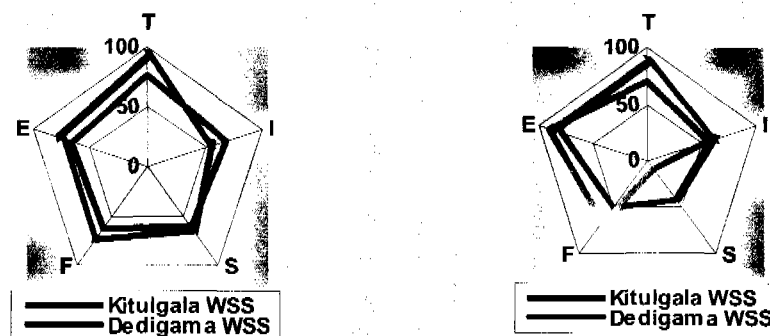
In general, overall environmental sustainability scores in both water supply systems meet the set criteria of 75.

**Overall comparison of sustainability dimensions in wet district**

Overall comparison of sustainability dimensions in wet district is shown in the figures 4.34 and 4.35. Each sustainable dimension scores for two water supply systems are compared in the view of both household and O&M authority (CBO).



**Figure 4.34: Comparison of two small town water supply systems in wet district on sustainability dimensions**



**a) Households**

**b) O&M Authority(CBO)**

(T–Technical, I=Institutional, S=Social, F=Financial, E–Environmental)

**Figure 4.35: Sustainability diamonds as expressed by Household and O&M Authority for two water supply systems in wet district**

Figures 4.34 and 4.35 show that the scores for technical and environmental dimensions meet the threshold value of 75 for both water supply systems according to the households and CBOs. According to the households and CBOs, scores for institutional, social and financial dimensions are not up to the set criteria of 75 in two water supply systems.

In the view of CBOs of Kitulgala and Dedigama water supply systems, scores for social aspect are below the acceptable level. But it is better in Kitulgala than in Dedigama. This is a major issue to be addressed because, two systems are socially not accepted according to their own judgment. According to the view of CBO of Kitulgala water supply system, the other issue that should be attended is low score for financial dimension. This problem also should be solved as soon as possible because, trust of beneficiaries on CBO is very important for sustainability of the system. The above comparison shows that the Kitulgala water supply system shows better performance in all sustainability aspects better than Dedigama water supply system.

#### 4.7 Analysis of selected water supply system from World Bank Project

This section presents short description of selected small town water supply system from out of the ADB Project area and situated in Rathnapura district which was implemented as pilot project under the World Bank project in 1995 and completed in 1997. This water supply system was also implemented on the community participation approach.

##### 4.7.1 Description of selected water supply system

Kuruwita water supply system is situated in the Rathnapura district in wet zone of Sri Lanka. "Ranny" well (the well with horizontal laterals to the ground and river at the bottom of the well) constructed on the bank of "Kuru" river is the water source for Kuruwita water supply system. The present yield of the well is 1200 cubic meters per day. The treatment principle of this well is "Riverbank filtration". The river bed functions as a filter and water flows to the well from river after the filtration. Chlorination is done for disinfection before distributing water to consumers. Water is directly pumped from well to the elevated water tank constructed in higher elevation and after chlorination it is supplied to the distribution area. Number of connections in this water supply system is 1200 and all the connections are metered. Direct beneficiaries are about 6000. This water supply system is also managed by CBO named "Human Resources Development Foundation-Kuruwita".

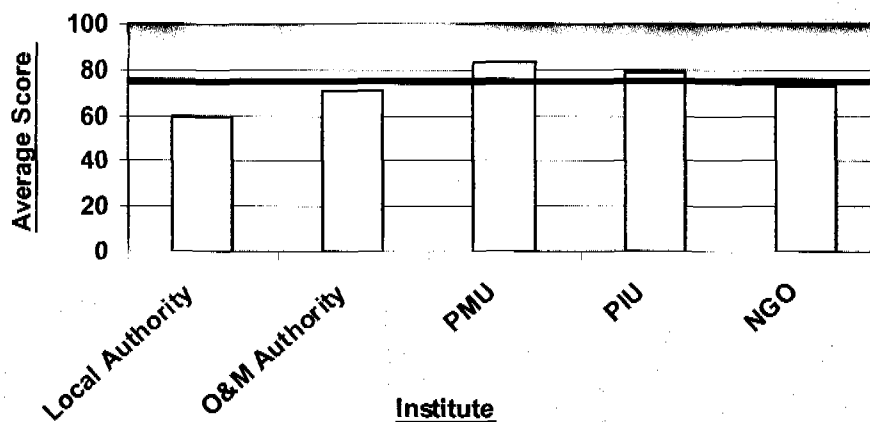


Figure 4.36: Water tower and intake well of Kuruwita water supply system.

#### 4.7.2 Analysis on project implementation

Analysis of project implementation arrangement in Kuruwita water supply system from WB project was also done together with the relevant organizations of local authority, CBO, project management unit, project implementation unit and NGO. Interviews based on the relevant questionnaires included in Annex A.2, A.3, A.4, A.5, A.6 and same number of officers as mentioned in case of wet and dry district were engaged from each institution. In total 18 persons were interviewed to evaluate the project implementation aspects for Kuruwita small town water supply systems. Assessment and scoring was done based on the criteria mentioned in tables 3.5 and 3.2 respectively.

Results of the survey in Kuruwita water supply system from WB project on project implementation are shown in figure 4.37. It presents the average scores given by each institute on different related questionnaires. Detail calculations and scores are in Annex E.



**Figure 4.37: Survey results on project implementation in Kuruwita water supply system**

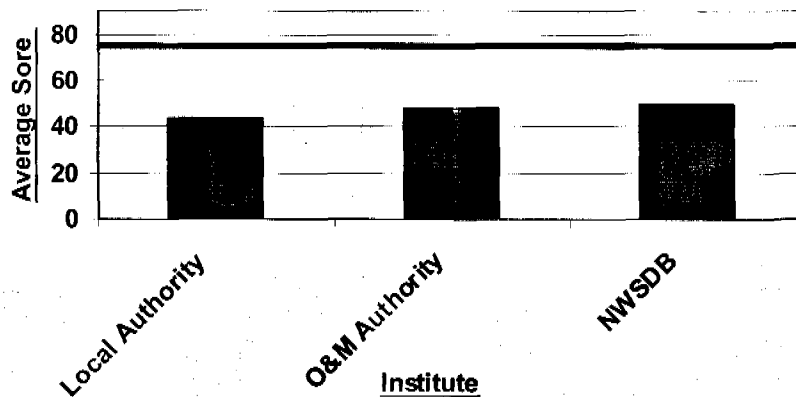
Figure 4.37 shows that, according to the project management unit and project implementation unit scores on project implementation are above the threshold value of 75. In views of NGO, CBO and local authority scores are 73, 71 and 59 respectively which are below the acceptable level. As explained in other two districts the project management unit and project implementation unit scores are above the acceptable value of 75, because they are the implementers of the project. Selections criteria for NGO and water supply option are not up to wishes of local authority. These are the reason for not meeting the set criteria of 75. NGO score also not meet the minimum required level because, they did not agree on the selections criteria for small town and method use to enter the community. Furthermore, the CBO score is also low on project implementation process, because they are not pleased with construction process because some of the work done by contractors are not up to standards and also selection criteria is not as they wished.

#### 4.7.3 Analysis on institutional arrangement

Assessment on the institutional arrangement was also done as explained in the section 4.7.2. But the participating institutions and questionnaires are different. Institutions engaged on this analysis were relevant local authority, CBO and NWSDB regional

office as in dry and wet districts and questionnaires in Annex A.2, A.4 and A.7 were used. As mentioned earlier, similar officers from local authority and same number of executive members and caretaker of CBO participated in the evaluation. In addition to that, three key officers from NWSDB regional office also participated in the assessment process including regional manager, engineer and sociologist. In this evaluation 12 persons were involved. The assessment and scoring was done based on the criteria mentioned in tables 3.6 and 3.2 respectively.

Figure 4.38 shows the results of the survey in Kuruwita water supply system from WB project on project implementation. Results are based on the different related questionnaires in Annex A and related calculations presented in the Annex E.



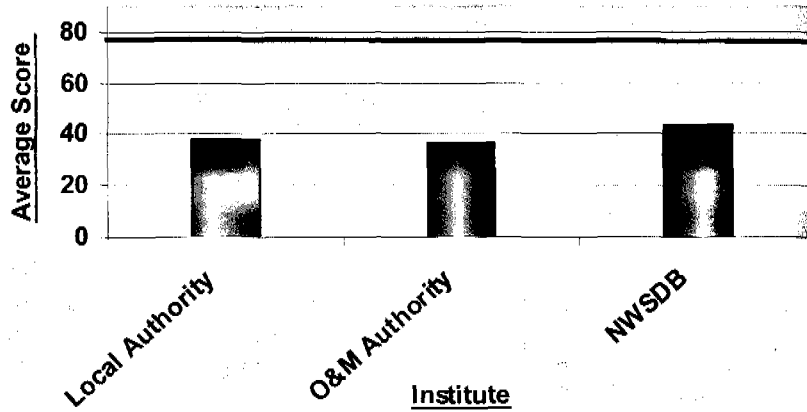
**Figure 4.38: Survey results on institutional arrangement in Kuruwita water supply system**

Results of the Kuruwita water supply system are also similar to the dry and wet district results. In the view of three institutions scores are below the acceptable value of 75 on institutional arrangement. Conflict between CBO executive committee is main reasons for the above results. This is directly affecting the sustainability of the system, because consumers are suffering from operational and maintenance issues. The above internal conflict within the executive committee is presently at the peak level. Therefore the local authority and the commissioner of local government in Sabaragamuwa province also intervened to settle the problem. At the moment the water supply system is managed by a temporary committee appointed by commissioner of local government of Sabaragamuwa province under his close supervision till the issue is resolved. The committee consists of consumers and elected members from local authority.

#### 4.7.4 Analysis on backup support system

The assessment on backup support system was done using the relevant questionnaires in Annex A.2, A.4 and A.7. The analysis is similar to the assessment of institutional arrangement. Institutions engaged and number of officers that participated from each institution was also same. Evaluation and scoring was done based on the criteria mentioned in tables 3.7 and 3.2 respectively.

Average scores of the Kuruwita water supply system on backup support system are shown in figure 4.39. Results are based on the different related questionnaires in Annex A and related calculations are included in Annex E.



**Figure 4.39: Survey results backup support system in Kuruwita water supply system**

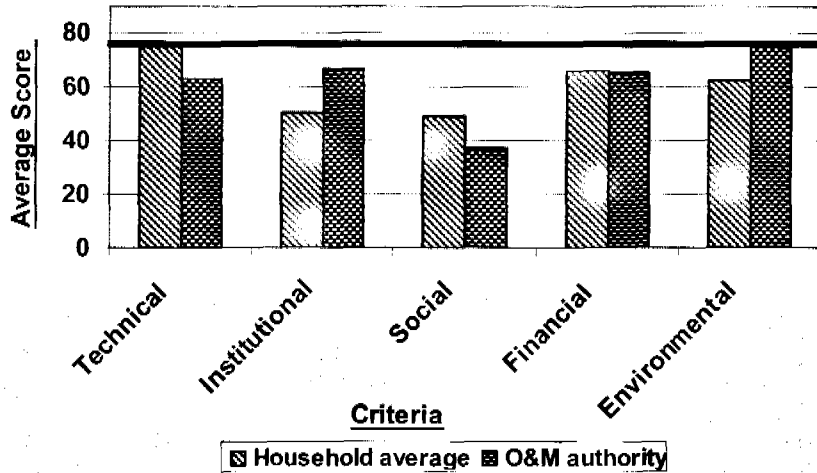
Figure 4.39 shows that all the scores for backup system in Kuruwita water supply system are below the acceptable score of 75. The poor coordination among all institution is the main reason for low scores as in dry and wet districts. This is again due to inattention of responsibilities mentioned in tripartite agreement signed between local authority, O&M authority and NWSDB. The mechanism for coordination among three institutions and responsibilities is clearly indicated in the agreement, but it has been neglected by local authority and NWSDB regional office. This negligence is the basis for the present institutional crisis faced by Kuruwita water supply system.

#### 4.7.5 Analysis on sustainability dimensions

The survey for analysis on sustainability dimensions was done with randomly selected 25 households who are direct beneficiaries of water supply system and the same number of officers from CBO of the water supply system. In total 31 persons were involved in evaluation of sustainability dimensions for Kuruwita small town water supply system. Results of the analysis are compared as the views of households and CBO. The evaluation was done using the relevant questionnaires in Annex A.1 and A.2 and analysis was done based on the criteria mentioned in table 3.3 and 3.4 for households and for CBOs respectively and scoring was done as per the table 3.2.

Figure 4.40 shows the survey results (average scores) of the Kuruwita water supply system on sustainability dimensions which was acquired using different related questionnaires in Annex A. Detail calculations and scores are included in Annex E.

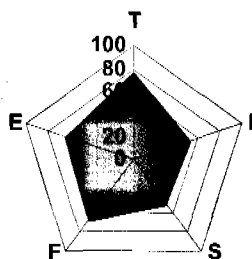




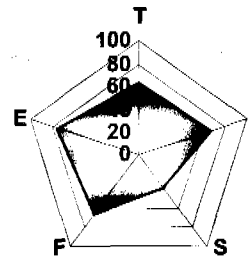
**Figure 4.40: Survey results on sustainability dimensions in Kuruwita water supply system**

According to the survey for technical aspects, scores in the views of beneficiaries are 75 and in view of the CBO in environmental sustainability aspect is also 75 which meets the acceptable value. All the other aspects are below the threshold value of 75 for both parties. Main reasons for that is poor management in all aspects of water supply system due to internal conflict within the CBO. These results are due to the failure of institutional, social and financial dimensions with no transparency on CBO accounts, executive committee and general members are not meeting regularly, poor attention on record keeping in stores, breakdowns and consumer complains.

Figure 4.41 shows the sustainability diamonds of Kuruwita water supply system in views of both household and CBO. The average overall sustainability scores are 61 and 60 respectively which is below the acceptable value of 75.



**a) Households**



**b) O&M Authority (CBO)**

(T=Technical, I=Institutional, S=Social, F=Financial, E=Environmental)

**Figure 4.41: Sustainability diamonds as expressed by Household and O&M Authority for Kuruwita water supply system**

#### 4.8 Comparison of five small town water supply systems in dry and wet districts and from WB project

Comparisons of five water supply systems were done on the wet vs. dry districts and the ADB vs. WB projects on the basis of their individual average scores on project implementation, institutional arrangement, backup support system and sustainability dimensions.

##### 4.8.1 Comparison of project implementation

###### Wet district vs. Dry district

Figure 4.42 shows the comparison of the average scores of small town water supply systems in wet and dry districts on project implementation activities.

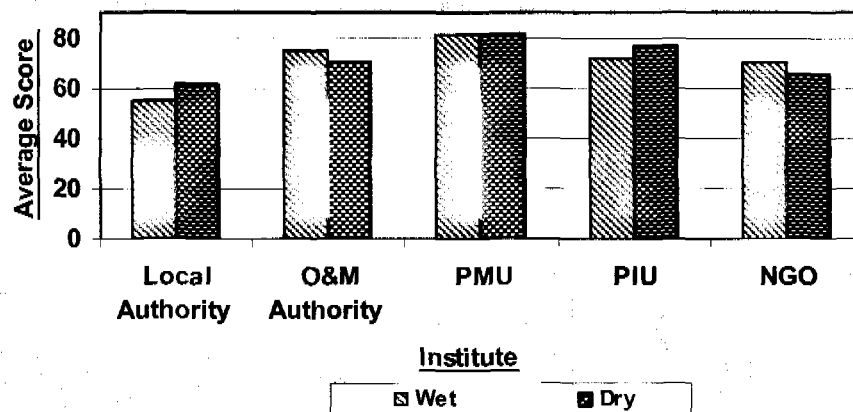
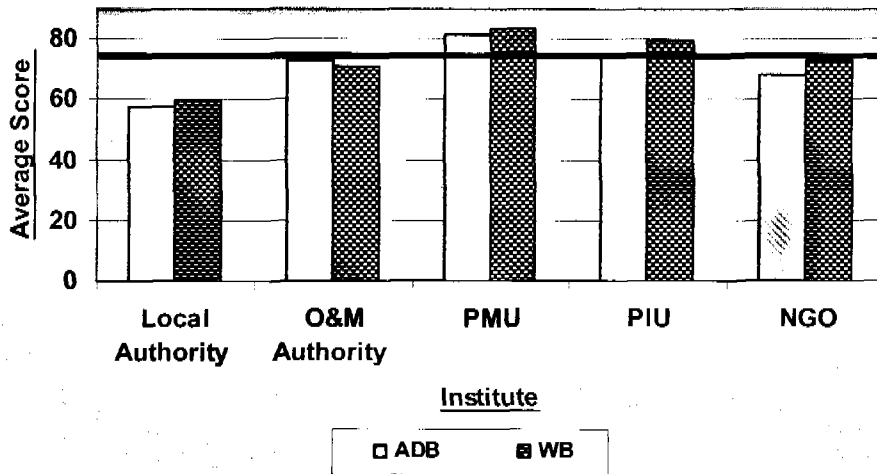


Figure 4.42: Comparison of small town water supply systems in wet and dry districts on project implementation

Figure 4.42 shows the average scores according to all the institutions on project implementation process. The view on project implementation of the project management unit is above the threshold value of 75 for both wet and dry districts. But scores of all the other institutions are below the acceptable value. This is due to shortfall of project implementation in both wet and dry districts. This shows that there is not much difference between wet and dry districts. Therefore it is required to reorganize activities of the project implementation process on the issues mentioned in earlier sections for both dry and wet districts.

###### ADB Project vs. WB Project

Small town water supply systems in ADB project and WB project were compared on average scores of project implementation and results are shown in the figure 4.43.



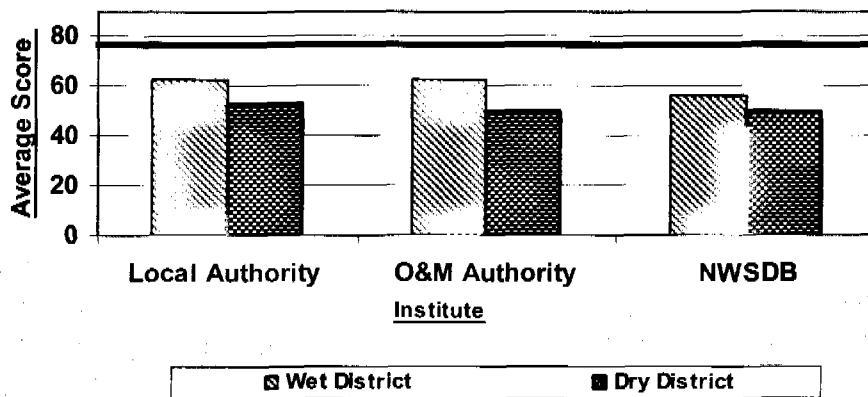
**Figure 4.43: Comparison of small town water supply systems in ADB and WB projects on project implementation**

According to the figure 4.43 local authorities, CBOs and NGOs have the views that both ADB and WB projects are below the acceptable value of 75 as in dry and wet districts. Both projects were implemented by NWSDB. Therefore, it is necessary to improve the project implementation process in deficit areas pointed out in earlier sections.

*4.8.2 Comparison of institutional arrangement*

Wet district vs. Dry district

Comparisons of results on institutional arrangement for small town water supply systems in dry and wet districts are shown in the figure 4.44.



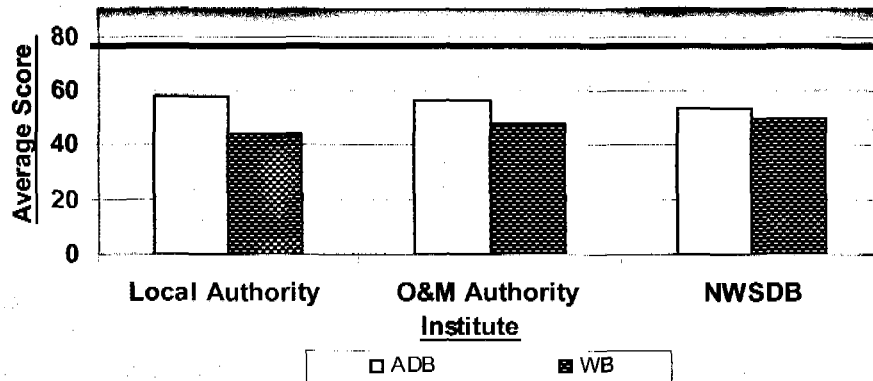
**Figure 4.44: Comparison of small town water supply Systems in wet and dry districts on institutional arrangement**

Figure 4.44 shows that according to local authorities, CBOs and NWSDB regional offices scores on institutional arrangement are not meeting the minimum required value of 75 for both dry and wet districts. But scores shows that the institutional arrangement in wet district is better than in dry district. Therefore more attention should be given to

dry district on improvement of institutional arrangement to overcome the short falls mentioned in earlier sections.

#### ADB Project vs. WB Project

Figure 4.45 shows the comparison of small town water supply systems in ADB and WB projects on institutional arrangement.



**Figure 4.45: Comparison of small town water supply systems in ADB and WB projects on institutional arrangement**

According to all the three institutes, scores of institutional arrangement are not meeting the acceptable value of 75 as in dry and wet districts. However, ADB project scores are above the acceptable level than WB project scores. Therefore more emphasis should be given to improve institutional arrangements in WB project. The WB project was completed about nine years ago and ADB project was completed two years ago. Hence it is needed give quick attention in improvement on institutional arrangement, otherwise the situation of ADB projects will become worse in future.

#### *4.8.3 Comparison of backup support system*

##### Wet district vs. Dry district

Small town water supply systems in dry and wet districts were compared on backup support system and results shown in the figure 4.46

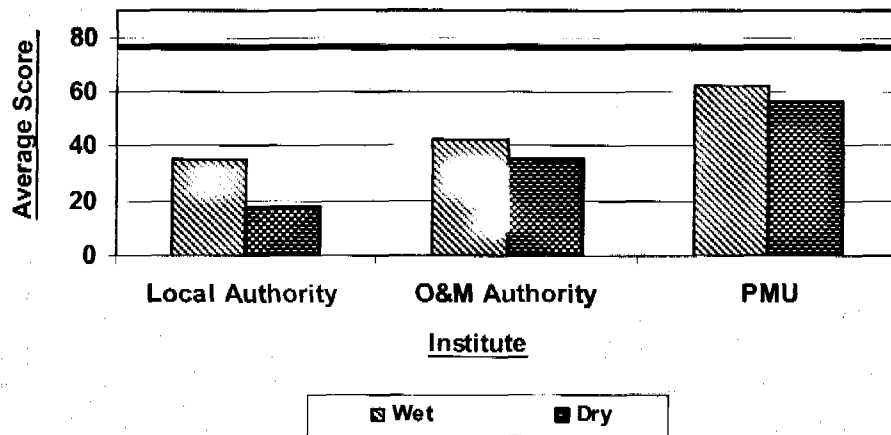


Figure 4.46: Comparison of small town water supply Systems in wet and dry districts on backup support system

On backup support system scores given by of local authorities, CBOs and NWSDB regional offices are below the threshold value of 75 in both dry and wet districts. The results show that the wet district is better than dry district in backup support system. Therefore all the institutions should give more attention on tripartite agreement activities in dry district.

ADB Project vs. WB Project

A comparison results on backup support system for small town water supply systems in ADB and WB projects are shown in the figure 4.47.

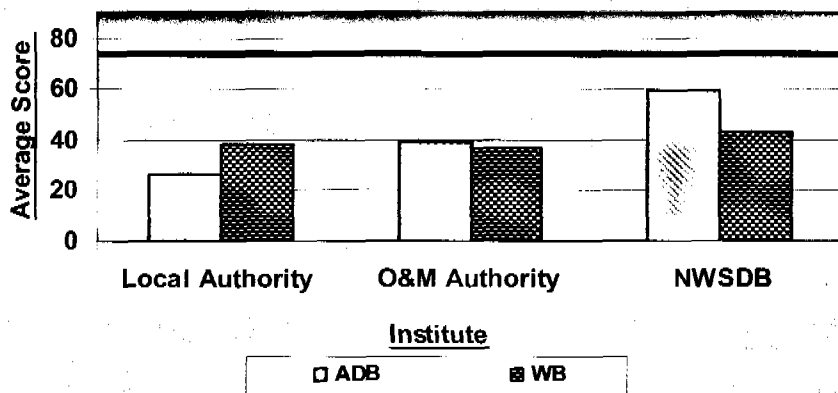


Figure 4.47: Comparison of small town water supply systems in ADB and WB projects on backup support system

In the views of all three institutions, as shown in figure 4.47, scores of backup support system do not meet the minimum required level of 75. But in the view of NWSDB, ADB project are better than WB project and in view of local authority it is vice versa. Therefore the backup support system should be improved with the concurrence of both NWSDB and local authorities as pointed out in earlier sections.

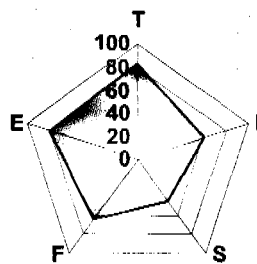
#### 4.8.4 Comparison of sustainability dimensions

##### Wet district vs. Dry district

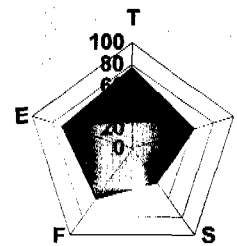
Technical, institutional, social, financial and environmental sustainability dimensions in water supply systems in wet and dry districts were compared based on the average scores given by households and CBOs on different related questionnaires in Annex A.1 and A.2. Table 4.12 and figure 4.48 show the comparison of each sustainability dimension.

**Table 4.12: Average scores for sustainability dimensions of water supply systems in dry and wet districts (average of households and O&M authorities scores)**

| Sustainability dimension | Wet District | Dry District |
|--------------------------|--------------|--------------|
| Technical                | 82           | 76           |
| Institutional            | 61           | 60           |
| Social                   | 44           | 40           |
| Financial                | 64           | 58           |
| Environmental            | 79           | 69           |
| Overall                  | 66           | 61           |



a) Wet district



b) Dry district

(T=Technical, I=Institutional, S=Social, F=Financial, E=Environmental)

**Figure 4.48: Sustainability diamonds as expressed as Households and O&M Authority (averages for water supply systems in dry and wet districts)**

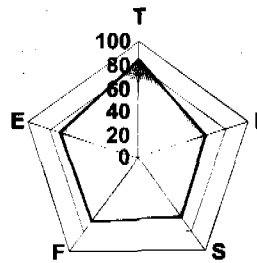
According to the table 4.12 and figure 4.45 technical aspects in small town water supply systems are above the threshold value of 75 and all the other sustainability aspects are below the acceptable level in view of both households and CBOs in dry as well as in wet districts. But the scores for wet district are better than that of dry district in all sustainability aspects. Therefore more attention should be given to dry districts than wet districts for improvements.

### ADB Project Vs WB Project

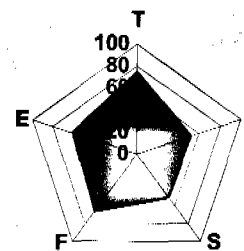
Sustainability dimensions of ADB and WB project water supply systems are compared based on the average scores given by households and CBOs on different related questionnaires in annex A.1 and A.2. Table 4.13 and figure 4.49 show the comparison of each sustainability dimension.

**Table 4.13: Average scores for sustainability dimensions of water supply systems in ADB and WB projects (average of households and O&M authorities scores)**

| Sustainability dimension | ADB | WB |
|--------------------------|-----|----|
| Technical                | 84  | 75 |
| Institutional            | 62  | 51 |
| Social                   | 63  | 49 |
| Financial                | 68  | 66 |
| Environmental            | 71  | 62 |
| Overall                  | 70  | 61 |



a) ADB Project



b) WB Project

(T=Technical, I=Institutional, S=Social, F=Financial, E=Environmental)

**Figure 4.49: Sustainability diamonds as expressed as Households and O&M Authority (averages for water supply systems in ADB and WB projects)**

According to both households and CBOs technical aspects in small town water supply systems are meeting the minimum required value projects of 75 in ADB and WB projects. All the other sustainability aspects are below the acceptable level. But the scores in ADB projects are relatively better than in WB projects in all sustainability aspects. Therefore it is essential give more attention on improvements of these aspects in both projects, otherwise it is likely that ADB projects also will show poor performance within next few years.

In general it was observed that all aspects of ADB project had higher scores than WB project. This is because there are some improvements in project implementation process in ADB project than in WB project. Furthermore continuing support during last 9 years for WB project was at very low level from local authority and NWSDB regional office.

## **4.9 Lessons learned and strategies for improvement of small town water supply system in Sri Lanka**

This section describes the lessons learned based on the field survey from the ADB project on project implementation, institutional arrangement, backup support system and sustainability aspects (technical, institutional, social, financial and environmental) separately in five water supply systems. Furthermore short-term and long-term strategies and responsibility chart to improve the existing situation is also presented.

### *4.9.1 Lessons learned from evaluation*

#### On project implementation

- Limited participation of beneficiaries during planning and construction period.
- Inappropriate selection criteria of small towns within the district
- Selection criterion of NGOs is not satisfactory to local authorities.
- Poor coordination among local authorities and NGOs.
- Lack of training for selected NGOs on project implementation activities and on scope of the project
- Non-availability of experienced staff in selected NGOs especially in technical skills.
- Limited training programmes on technical and project implementation strategies for NGO staff.
- Method used to enter the community is not up to the wishes of local authorities and NGOs.
- CBOs are not satisfied at all with handing over process of water supply system.
- Unnecessary delays in payments for CBO contracts.
- Delay in payments for NGO's service contract due to faults of PIU/PMU.
- Delay in approvals for water resources from government organisations.
- CBOs are not satisfied on quality of contractors work.
- Low priority for catchment preservation programmes within the project cycle.
- Poor coordination between NWSDB regional office and PIU during implementation period.
- Delay in supply of pumps, pipes and accessories.
- No consolidation activities launched from the beginning of the project.

#### On institutional arrangement

- CBOs do not have enough regulation and legal authority to operate the water supply system effectively.
- Less logistic facilities in CBO to operate the water supply system smoothly.
- CBOs do not meet regularly.
- Lack of coordination among CBOs, local authorities and other government organizations.
- No collective decisions among CBO key members.
- Legality of CBO is questionable in issues like disconnection of water supply connection due to failure in payments of water bills and water theft.



### On backup support system

- Less attention paid on tripartite agreement between CBOs, local authorities and NWSDB regional offices for O&M activities
- No activities identified for CBO forums and forums are not linked with the present institutional setup on backup support system.
- Poor coordination mechanism among CBOs, local authorities and NWSDB regional offices.
- Responsibilities mentioned in tripartite agreement are not followed by each party, especially local authorities and some of the NWSDB regional offices.
- Non-availability of maintenance fund or loan facilities to get help in emergency situation or new developments for CBOs.
- No continuation of training programs for CBOs.

### On sustainability dimensions

- Technical aspects
  - ✓ No regular water quality monitoring program in CBOs
  - ✓ Less interest for chlorination.
  - ✓ Water quality is not up to standards due to iron in deep bore holes in some water supply systems.
  - ✓ Water tariff is high due to energy cost in pumping systems.
  - ✓ Water quantity supplied by CBOs is not enough in some water supply systems
  - ✓ The use of galvanized iron pipes for culvert and bridge crossings is a maintenance problem
  - ✓ No clear preventive maintenance programs.
  - ✓ Residual pressure is not up to the minimum level of 10 mwc in whole distribution system.
  - ✓ No single action taken by CBOs to monitor the NRW in all water supply systems.
- Institutional aspects
  - ✓ Poor management skills of CBOs.
  - ✓ Small number of women membership in executive committee of CBOs.
  - ✓ Beneficiaries have no access to CBOs officials.
  - ✓ No transparency in accounts of CBOs.
  - ✓ Low priority for auditing of accounts.
- Social aspects
  - ✓ System is not available for CBOs to inform major break downs and planned repairs in advance.
  - ✓ Decreasing sense of ownership during O&M phase.
  - ✓ No regular meetings between consumers and CBOs.
  - ✓ Shortage of water supply in intermittent water supply systems.
  - ✓ Conflicts between two parties within CBOs.
  - ✓ Water supply to poor and disadvantages groups is an issue.

- Financial aspects
  - ✓ No awareness on tariff system within consumers.
  - ✓ Water service is not at satisfactory level and this is reducing the willingness to pay.
  - ✓ Inaccuracy in billing system is decreasing the willingness to pay.
  - ✓ Less awareness on water saving measures in consumers.
  - ✓ Poor attention on annual auditing and publishing of accounts in CBOs.
  - ✓ The payments of the water bill directly to O&M authority (CBO) increased the risk of theft and fraud.
  
- Environmental aspects
  - ✓ No waste water management systems in all small towns surveyed.
  - ✓ Less commitment on catchment protection activities and tree planting programs.
  - ✓ No waste separation and collection within the small town areas.
  - ✓ Less attention on keeping clean environment at water treatment sites and around water points.

#### 4.9.2 Short-term strategies and responsible institutes to improve the existing situation

Several activities should be carried out in short-term to improve the existing situation in implementation arrangement in the project to use for ongoing and future projects. In the mean time actions also should be taken in short-term strategies on institutional arrangement, backup support system and sustainability aspects to sustain the completed water supply systems. Tables 4.14(a) to 4.14(d) outline short-term strategies and organizations which are responsible to carry out these actions.

**Table 4.14(a): Short-term strategies and responsible organizations for project implementation arrangement**

| No. | Short-term strategy   | Responsible organization |
|-----|---|--------------------------|
| 01  | Present coordination mechanism between local authorities and NGOs should be reviewed and a regular meeting system should be introduced for participation of both parties and it should be monitored.                                      | PIU                      |
| 02  | Present training programs should be reviewed and special attention should be given to training of NGO staff on project scope, strategies project implementation activities and technical aspects  | PMU/PIU                  |
| 03  | Method use to enter the community should be revised with the concurrence of NGOs and local authorities  | PMU                      |
| 04  | Handing over process of water supply system to O&M authority should be re-evaluated and handing over document should be prepared with as built drawings, operation manuals, duties and responsibilities of caretaker and other staff etc. | PMU/PIU                  |

|    |  |             |
|----|--|-------------|
| 05 | Delaying in payments for CBO contracts should be minimised and system should be introduced to avoid delay in payments for NGO's service contract due to faults of PIU/PMU. | PMU/PIU     |
| 06 | Approvals for water resources from government organisations should be expedited with close coordination of relevant government departments.                                | PIU/NGO     |
| 07 | Quality of contractors work should be improved with close supervision and best contract management practices.  | PIU/NGO     |
| 08 | Priority should be given to catchment preservation programmes within the project cycle.  | PMU/PIU/NGO |
| 09 | Coordination between NWSDB regional office and PIU during implementation period should be improved.  | PIU/PMU     |
| 10 | Pumps and pipes should be supplied to sites without delay.   | PMU         |

**Table 4.14(b): Short-term strategies and responsible organizations on institutional arrangement**

| No. | Short-term strategy  | Responsible organization |
|-----|--|--------------------------|
| 01  | CBOs should review the present regulations and prepare additional regulations for O&M activities for the water supply system with the help of NWSDB. | CBO/NWSDB                |
| 02  | Logistic facilities should be increased by CBOs to operate the water supply systems to attend break downs and preventive maintenance without delay.  | CBO                      |
| 03  | Regular meetings should be arranged to meet officers of CBOs at least once a month and it is to be monitored by local authorities                    | CBO/LA                   |
| 04  | Better coordination mechanism between CBOs and local authorities should be introduced by NWSDB and it should be monitored.                           | CBO/LA/NWSDB             |
| 05  | Training program should be introduced by LA or NWSDB on leadership qualities to CBOs and NGOs.   | NWSDB/LA                 |

**Table 4.14(c): Short-term strategies and responsible organizations on backup support system**

| No. | Short-term strategy   | Responsible organization |
|-----|---|--------------------------|
| 01  | Tripartite agreement between CBOs, local authorities and NWSDB regional offices for O&M activities should be closely monitored and regular meetings should be arranged among all parties at least once in two months. | CBO/LA/NWSDB             |

**Table 4.14(d): Short-term strategies and responsible organizations on sustainability dimensions**

| No. | Short-term strategy  | Responsible organization                         |
|-----|--|--|
| 01  | Technical aspects <ul style="list-style-type: none"> <li>a. Water quality monitoring program should be initiated.</li> <li>b. Galvanized iron pipes, which are used for culvert and bridge crossings, should be replaced immediately</li> <li>c. Preventive maintenance plan is necessary to avoid breakdowns and should be monitored</li> <li>d. Residual pressure should be maintained at the minimum level of 10 mwc.</li> </ul>      | CBO/NWSDB<br><br>CBO<br><br>CBO/NWSDB<br><br>CBO |
| 02  | Institutional aspects <ul style="list-style-type: none"> <li>a. Beneficiaries should have easy access to CBOs officials in their office at working hours.</li> <li>b. Monthly accounts should be published to all consumers by putting on notice boards or by handbills.</li> </ul>  | CBO<br><br>CBO                                   |
| 03  | Social aspects <ul style="list-style-type: none"> <li>a. System should be introduced for CBOs to inform major break downs and planned repairs in advance by using hand bills or announcements.</li> <li>b. Conflicts between two parties within CBOs should be settled as soon as possible.</li> <li>c. Building of close relationship between CBOs and consumers should be done by regular meetings and awareness campaigns.</li> </ul> | CBO<br><br>LA/CBO<br><br>CBO                     |
| 05  | Financial aspects <ul style="list-style-type: none"> <li>a. Water service should at satisfactory level in all the aspects to increase the willingness to pay.</li> <li>b. Accurate and apparent billing system should be practiced to increase the willingness to pay.</li> </ul>  | CBO/NWSDB<br><br>CBO                             |
| 06  | Environmental aspects <ul style="list-style-type: none"> <li>a. Waste separation and collection activities should be implemented by O&amp;M authority (CBO) at household level.</li> <li>b. Keeping clean environment at water treatment sites and around water points should be arranged by CBOs.</li> </ul>  | CBO/LA<br><br>CBO                                |

Out of the different short-term strategies mentioned above, the following are the five main activities, in order of priority that should be implemented in short-term to improve the existing situation.

1. Tripartite agreement between CBOs, local authorities and NWSDB regional offices for O&M activities should be closely monitored and regular meetings should be arranged among all parties at least once in two months.
2. Preventive maintenance plan should be prepared by CBO and it should be monitored by NWSDB regional office every three months.
3. Regular meetings should be arranged to meet officers of CBOs at least once a month and CBO general meeting with consumers should be held every six months.
4. Water quality monitoring program should be initiated by CBOs with the help of NWSDB regional offices.
5. Handing over process of water supply system to CBOs should be re-evaluated and handing over document should be prepared with as built drawings, operation manuals, duties and responsibilities of caretaker and other staff.

#### *4.9.3 Long-term strategies and responsible institutes to improve the existing situation*

Long-term strategies should be implemented to improve the existing situation in addition to the short-term strategies on implementation arrangement for the ongoing and future projects. Table 4.15(a) to 4.15(d) outlines long-term strategies and organizations which are responsible to carry out these actions.

**Table 4.15(a): Long-term strategies and responsible organizations for project implementation arrangement**

| No. | Long-term strategy  | Responsible organization |
|-----|---|--------------------------|
| 01  | Selection criteria of small towns within the district should be reviewed and it should not be biased on politicians or any other outside influences. For the revision of criteria, local authorities should be consulted. | PMU                      |
| 02  | NGO selection criteria should also be reviewed and it should focus on their experience on social mobilisation and availability of qualified staff.  | PMU                      |
| 03  | Criteria should be introduced for the recruitment of experienced technical staff to selected NGOs.  | PMU                      |
| 04  | Comprehensive program for consolidation activities should be prepared and it should be monitored closely from the beginning of the project with experienced personnels.   | PMU/PIU                  |

**Table 4.15(b): Long-term strategies and responsible organizations on institutional arrangement**

| No. | Long-term strategy  | Responsible organization |
|-----|---|--------------------------|
| 01  | CBOs should be upgraded to legal bodies according to prevailing Sri Lankan law with enough legal authority to address issues like disconnection of water supply connection due to failure in payments of water bills and water theft. | PMU                      |

**Table 4.15(c): Long-term strategies and responsible organizations on backup support system**

| No. | Long-term strategy   | Responsible organization |
|-----|--|--------------------------|
| 01  | CBO forums should be activated within districts and forums should be linked with the present institutional setup on backup support system. | PMU/PIU                  |
| 02  | Maintenance fund or loan facilities should be introduced by the project to help in emergency situation and new developments for CBOs.      | PMU                      |
| 03  | Training programs for CBOs should be continued.  | LA/NWSDB                 |

**Table 4.15(d): Long-term strategies and responsible organizations on sustainability dimensions**

| No. | Long-term strategy  | Responsible organization                                       |
|-----|---|--|
| 01  | <p>Technical aspects</p> <ul style="list-style-type: none"> <li>a. Water should be treated to meet the standards.</li> <li>b. Water should be supplied by gravity wherever possible or with low-cost appropriate treatment.</li> <li>c. Adequate and reliable water sources should be identified for water supply systems.</li> <li>d. NRW should be monitored by CBO</li> </ul>  | <p>CBO/NWSDB<br/>CBO/NWSDB<br/><br/>CBO/NWSDB<br/><br/>CBO</p> |
| 02  | <p>Institutional aspects</p> <ul style="list-style-type: none"> <li>a. Management skills of CBOs should be improved by leadership and management training.</li> <li>b. Women membership in executive committee of CBOs should be increased by awareness.</li> <li>c. Formation of water committee should be done in the democratic way from the street level meetings.</li> <li>d. Accounts should be audited by the internal auditor and should be approved by the executive committee.</li> </ul> | <p>LA/NWSDB<br/><br/>CBO<br/><br/>CBO<br/><br/>CBO/LA</p>      |

|           |  |                                    |
|-----------|--|------------------------------------|
| <b>03</b> | <b>Social aspects</b><br><b>a.</b> Community involvement activities should be arranged to build the sense of ownership during O&M phase too.<br><b>b.</b> Program should be launched to build small water storage tanks at household level in intermittent water supply systems.<br><b>c.</b> Water supply should be provided to poor and disadvantages groups with subsidy. | CBO<br><br>LA/CBO<br><br>LA/CBO    |
| <b>04</b> | <b>Financial aspects</b><br><b>a.</b> Water tariff should be fixed with the concurrence of beneficiaries and should be approved in CBO general meeting.<br><b>b.</b> Introduction of water savings measures should be done by CBOs.<br><b>c.</b> Annual audit report of the accounts of CBOs should be prepared by an external reputed agency.                               | CBO/LA/NWSDB<br><br>CBO<br><br>CBO |
| <b>05</b> | <b>Environmental aspects</b><br><b>a.</b> Wastewater management should be a must for small towns.<br><b>b.</b> Catchment protection activities and tree planting programs should be introduced   | LA/ CBO<br><br>CBO                 |

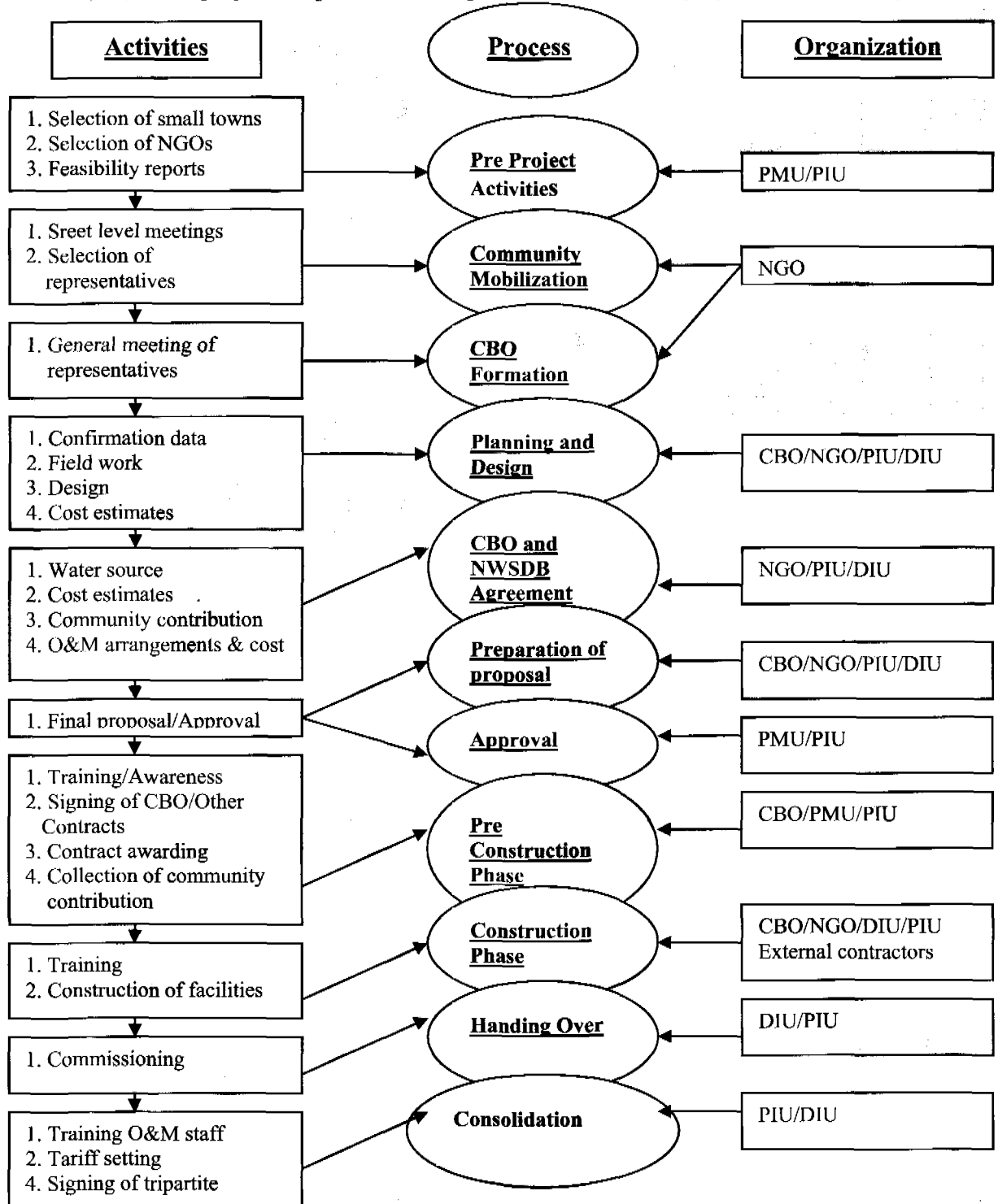
Out of the different long-term strategies mentioned above, followings are the eight main activities that should be implemented to improve the existing situation in the order of priority.

1. Water should be supplied by gravity wherever possible or with low cost appropriate treatment systems such as riverbank filtration.
2. Actions should be taken to monitor and reduce the NRW by CBOs.
3. CBOs should be upgraded to legal bodies according to prevailing Sri Lankan law with enough legal authority to address issues like disconnection of water supply connection due to failure in payments of water bills and water theft.
4. NGO selection criteria should be reviewed and it should focus on their experience on social mobilisation and availability of qualified staff.
5. Consolidation program should be prepared and activities should be monitored closely from the beginning of the project with experienced personnels.
6. CBO forums should be activated within districts and forums should be linked with the present institutional setup on backup support system.
7. Maintenance fund or loan facilities should be introduced by the project to help in emergency situation and new developments for CBOs.

8. Monthly accounts should be published to all consumers by putting on notice boards or by handbills and annual auditing of CBO accounts should be done by an external reputed agency and should be published.

4.9.4 Existing and proposed project implementation process

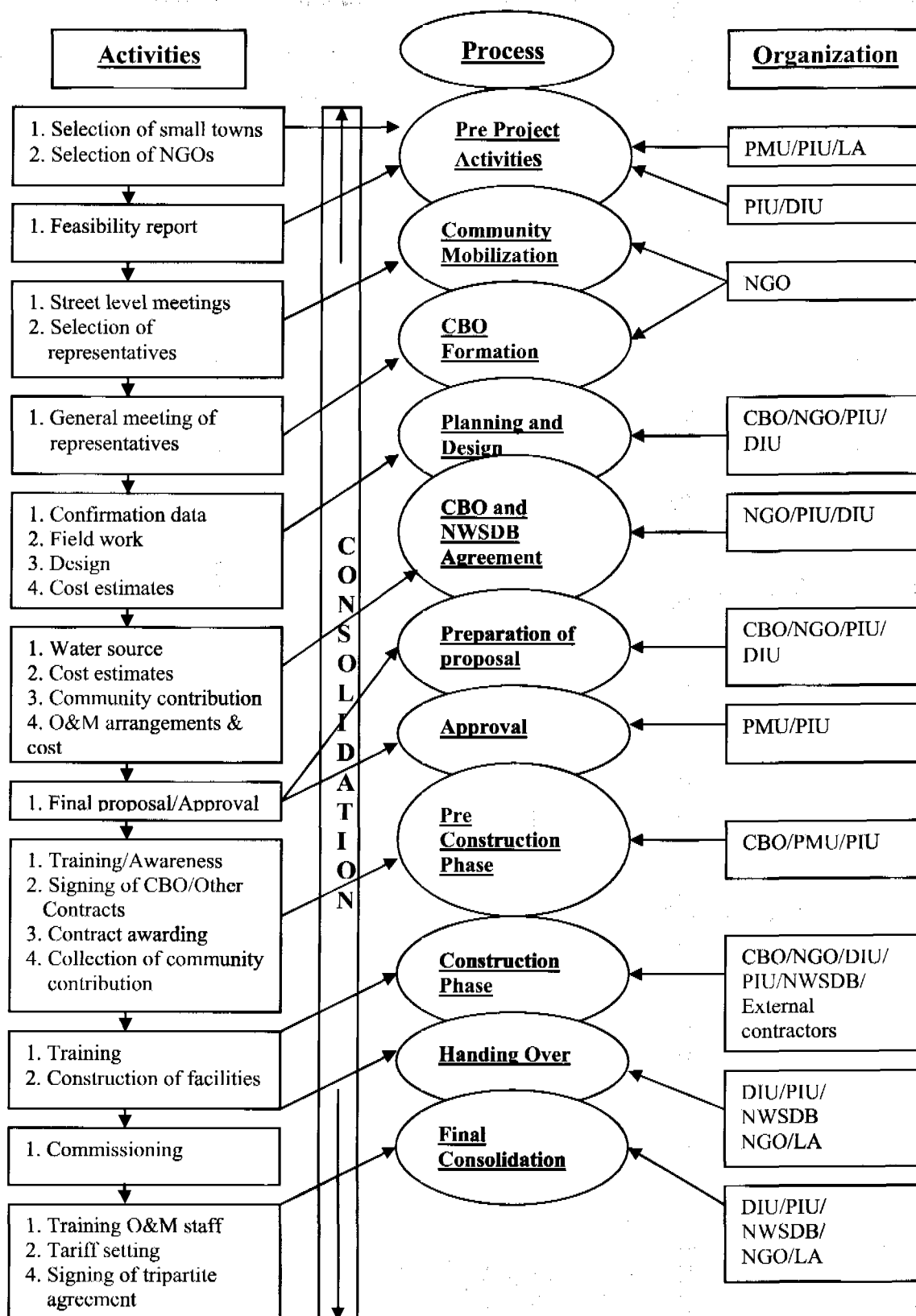
Figures 4.50 and 4.51 show the existing project implementation process of ADB project and the proposed project implementation process for future projects respectively.



Source: ADB (1997)

Figure 4.50: Existing project implementation process in ADB project





**Figure 4.51: Proposed implementation process for future projects**

The following major changes should be introduced in the existing project implementation process to improve the weaknesses which were identified during the small town water supply system survey.

- Local authorities and NWSDB regional staff should be involved during the selection of small towns and NGOs.
- NWSDB regional staff should be involved during construction phase to improve of quality of work and for the better coordination with CBOs and project staff.
- The handing over of water supply system should be done by the committee consisting of officers of NGOs, local authorities and NWSDB regional office.
- Consolidation activities should be included in each step of the project implementation process.
- The final consolidation activities should be monitored by the committee appointed for the handing over of water supply system.

#### *4.9.5 Prerequisites for implementation of suggested strategies*

The above mentioned short-term and long-term strategies are very important for the sustainability of small town water supply systems which are managed by CBOs. The following are the prerequisites for successful implementation of the above strategies and sustainability of small town water supply systems.

- NWSDB should implement all the small town water supply systems in close coordination with CBOs and local authorities in the region.
- Additional funds should be made available to improve social, institutional and financial aspects of completed small town water supply systems.
- Engineers of PMU and PIU of NWSDB should be trained to act as facilitators of community based approach for implementing small town water supply systems.
- NWSDB regional office engineers and technical staff should be more oriented to keep close coordination with CBOs for continuing backup support especially in technical aspects of completed small town water supply systems in their region.
- Activities that need additional funds to improve the existing situation can be included to the ADB assisted fifth water supply and sanitation project, which will be implemented in near future.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

Based on literature review, field data collection and analysis following conclusions were made.

1. Evaluation of five small town water supply system showed that all the systems are good in technical and environmental aspects but weak in social, financial and institutional aspects.
2. ADB Project implementation process has focused on community based approach for sustainability of water supply systems. However local authorities, CBOs and NGOs are not satisfied with the process of selection of small towns and handing over of water supply systems to CBOs.
3. The present backup support system is not satisfactory due to non functioning of tripartite agreement signed between CBOs, local authorities and NWSDB regional offices.
4. There is no significant difference between the ADB assisted small town water supply systems in dry and wet districts in process of project implementation, institutional arrangement, and backup support system. However ADB assisted project showed slightly evaluation better compared to WB assisted projects.
5. Less communication within CBO and CBO with consumers is initiating unnecessary issues and splitting them due to misunderstanding. CBOs are not functioning properly due to lack of regulations.
6. There is no preventive maintenance plan which is a risk for pumps and other accessories in a water supply system. Initiation of maintenance fund or loan facilities to CBOs will help in emergency situation and new developments in water supply systems.
7. Compared to O&M authorities (CBOs), households (beneficiaries) of small town water supply systems have the view that project is more sustainable with high scores for technical and environmental aspects.
8. In order to improve the existing situation, functioning of tripartite agreement, adherence to preventive maintenance plan, regular meetings in CBOs, water quality monitoring program and re-evaluation of handing over process of water supply system to CBOs should be done in short-term.
9. Main long-term strategies for sustainability of CBO managed water supply systems are selection of gravity sources or low cost treatment methods, monitoring and reducing NRW, more legal power to CBOs, review of NGO and small town selection criteria, launch of consolidation program, activation of CBO forums, initiation of maintenance fund or loan facilities to CBOs and publishing CBO accounts.

10. In most of small town water supply systems, chlorination is the only treatment applied. There is no system of monitoring water quality other than bacteriological parameters.
11. Out of five small town water supply systems evaluated, Kitulgala water supply system got the highest score because the scores in technical and environmental aspects are higher than other systems which are the better sustainability aspects for all five systems. The scores for other aspects also comparatively high. This was followed by Saliyawa, Dedigama, Kirimetiya and Kuruwita water supply systems. The Kuruwita water supply system got the least score because, all the sustainability factors are far below compared to all other four water supply systems.

## 5.2 Recommendations

The followings are recommended for further improvements of implementation strategy of this type of projects, institutional arrangement and backup support system of CBO managed small town water supply systems towards sustainability.

1. Steps of selection criteria of small towns, selection of NGOs as partner organizations, recruiting of experienced staff for selected NGOs and handing over process of water supply system to CBOs in project implementation process should be reviewed and streamlined with local authorities and other relevant parties.
2. Low cost appropriate treatment methods should be introduced during the selection of water treatment facilities, where required.
3. A consolidation plan should be prepared before starting the project by considering each and every step of project and it should be closely monitored by experienced personnel during the implementation process.
4. The present institutional set up should be upgraded to more legally recognised organization like public private company with the allocations available in Sri Lankan company law to overcome legal and social issues that may arise during managing of small town water supply systems.
5. Local authorities and NWSDB regional offices should appoint responsible officers and their duties be allocated to function each and every activity mentioned in the tripartite agreement and to get involved in CBO forums within present backup support system.
6. NWSDB regional offices should arrange water quality monitoring program in CBO managed water supply systems with cost charge basis parallel to the normal water quality program in NWSDB managed water supply systems. CBOs also should get involved to the program.
7. Preventive maintenance plan should be prepared and monitored by CBOs with the help of NWSDB for longer run time of pumps and other accessories in small town water supply systems.
8. Regular meetings should be arranged within CBOs at least once a month and with consumers every six months to improve the communication gap within all parties.
9. Monthly accounts should be published at CBO office and annual audit report should be made available among all consumers.
10. The project should arrange maintenance fund to CBOs with the help of local authorities and provincial council government and loan facilities with commercial banks before completion of the project activities.



**REFERENCES**

- Abrams, L. (2001) Water for basic needs [1 paragraph]. The Water page. The Asian Development Bank (online).  
[www.thewaterpage.com/Documents/BasicNeeds.PDF](http://www.thewaterpage.com/Documents/BasicNeeds.PDF) [accessed on 01 September 2006]
- ADB (1997) Project recommendations document from ADB board. The Asian Development Bank (online).  
<http://www.adb.org/Documents/RRPs/SRI/rrp-R21397.pdf> [accessed on 29 August 2006]
- ADB (1999) Special Evaluation study on role of NGO & CBO in ADB Projects. The Asian Development Bank(online).  
[http://www.adb.org/NGOs/docs/ses\\_ngos.pdf#search=%22Loan%201575-SRI%3AThird%20Water%20Supply%20and%20Sanitation%20\(Sector\)%20Project%22](http://www.adb.org/NGOs/docs/ses_ngos.pdf#search=%22Loan%201575-SRI%3AThird%20Water%20Supply%20and%20Sanitation%20(Sector)%20Project%22)[accessed on 28 August 2006]
- ADB (2002) Project completion report – Indonesia.Rural water and sanitation sector Project, Asian Development Bank(online)  
[http://www.adb.org/Documents/PCRs/INO/pcr\\_IN26102.pdf](http://www.adb.org/Documents/PCRs/INO/pcr_IN26102.pdf) [assessed on 18 September 2006]
- ADB (2006) Completion Report Philippines: Small Towns Water Supply Sector Project. The Asian Development Bank (online).  
<http://www.adb.org/Documents/PCRs/PHI/27250-PHI-PCR.pdf#search=%22ADB%2BProject%20completion%20report%2BPhilippine%22>
- ADB(2006) Piloting Participatory Assessment Methodologies in Sri Lanka and Viet Nam in the 3<sup>rd</sup> ADB-Assisted Projects, Water Supply and Sanitation Sector Project 2006
- Bajard, Y. Draper, M and Viens, P. (1981) Rural water supply and related services in developing countries - Comparative analysis of several approaches *Journal of Hydrology*, Volume 51, Issues 1-4, Pages 75-88
- Bandara KRN (2005) National Water Policy for Sri Lanka. Concept paper (online).  
[http://www.gissl.lk/water\\_prof\\_day/water\\_prof\\_day\\_2005/webpapers\\_wpd05/pdf](http://www.gissl.lk/water_prof_day/water_prof_day_2005/webpapers_wpd05/pdf) [accessed on 03 September 2006]
- Butterworth,J (2006) Institutional Arrangement for Decentralized Water Supply And Sanitation. UNESCO- IHE lecture notes.
- Cotruvo,J A. Craum,G F Hearne,N (1998) Providing safe drinking water in small systems. – Paper series of first international symposium conducted by World Health Organisation..Pages 27-95
- De Silva, P K W (2005) CBO Federation for the sustainability of rural water supply The Paper presented in 31st WEDC conference in Kampala Uganda 2005.

Ediriweera I V W (2005), Strategies adopted for sustained water supply and sanitation through community participation in Sri Lanka. The Paper presented in 31<sup>st</sup> WEDC conference in Kampala Uganda 2005.

Genthe, B Strauss, N Seager, J Vundule, C Maforah, F and Kfir, R (1997) The effect of type of water supply on water quality in a developing community in South Africa. *Water Science and Technology*, Volume 35, Issues 11-12, Pages 35-40

GROW (2004) About Sri Lanka. GROW project (online)  
<http://www.niu.edu/srilankaproj/srilanka.html> [accessed on 12 September 2006]

Herrmann, T and Hasse, K (1997) Ways to get water: Rainwater utilization or long-distance water supply? A holistic assessment. *Water Science and Technology*, Volume 36, Issues 8-9, 1997, Pages 313-318

Hofmann, N and Mitchell, B (1998) The RESPECT model: evolving decision-making approaches in water management. *Water Policy*, Volume 1, Issue 3, Pages 341-355

Icke, J Boomen, RM V D and Aalderink R H A (1999) Cost-sustainability analysis of urban water management. *Water Science and Technology*, Volume 39, Issue 5, 1999, Pages 211-218

IRC (2005) Villagers say thank you for listening International Reference Centre (online) <http://www.irc.nl/page/26894> [accessed on 03 september 2006]

Liyanage, Ruwan (2006) Involvement of CBOs in managing rural water supply schemes ; lesson for the theory of rural water supply UNESCO-IHE M sc Thesis WM-2006

Maclontosh, A. C. (2003) Asian water Supplies – Reaching the Poor. Asian Development Bank (online).  
[http://adb.org/Documents/books/asian\\_water\\_supplies/asian\\_water\\_supplies.pdf](http://adb.org/Documents/books/asian_water_supplies/asian_water_supplies.pdf)  
[Accessed on 28 August 2006]

Mathew, B. (2005) Ensuring Sustained Beneficial Outcomes for Water and Sanitation Programmes. International Reference Centre (online).  
<http://www.irc.nl/content/download/23458/267858/file/OP40-E.pdf> [accessed on 04 September 2006]

Metrological Department of Sri Lanka (2005). Rainfall Data 2005

Mikkelsen, P S Adeler, O F Albrechtsen ,H J and Henze, M (1999) Collected rainfall as a water source in Danish households — what is the potential and what are the costs? *Water Science and Technology*, Volume 39, Issue 5, Pages 49-56

MUDWS, (2005) a Water supply projects details. Ministry of Urban Development and Water Supply - Sri Lanka.

MUDWS, (2005) b National Rural water Policy and Strategies. Ministry of Urban Development and Water Supply - Sri Lanka.



MUDWS, (2005) c National Rainwater Policy and Strategies. Ministry of Urban Development and Water Supply - Sri Lanka.

Obuobisa-Darko A and Asimah S E (2005), Sustainable operation and maintenance of Small Towns water supply systems in Ghana ,The Paper presented in 31<sup>st</sup> WEDC conference in Kampala Uganda 2005.

PCI (1997) Rural water supply and sanitation ,10<sup>th</sup> volume chapter 5. Planning Commission of India (Online)<http://planningcommission.nic>. [accessed on 05 September 2006]

PHAC (2002) Definitions of "Rural" Summary. Public Health Agency of Canada. (online) [http://www.phac-aspc.gc.ca/rh-sr/paper\\_e.html](http://www.phac-aspc.gc.ca/rh-sr/paper_e.html) [accessed on 12 September 2006]

Quintanilla, J. J. S. (2006) Sustainability analysis of water supply systems in Cochabamba. UNESCO-IHE Msc Thesis MWI-2006-13.

Secure Water research: National workshop in Sri Lanka December 2003 (online) [http://www.securewater.org/mainphase/SriLanka\\_dec03workshop.asp](http://www.securewater.org/mainphase/SriLanka_dec03workshop.asp) [assessed on 10 September 2006]

Shanthasiri HKS and Wijesooriya R (2005) Case Study on Community Involvement in Rural Water Supply Sri Lanka, The Paper presented in 31<sup>st</sup> WEDC conference in Kampala Uganda 2005.

Sharma, S (2006) Decentralised Water Supply and Sanitation. UNESCO- IHE lecture notes.

TEAMS consultants in Development, (2004) Study of Water Supply in Small Towns in Sri Lanka, Meritec Ltd, New Zealand, 2004.

Thalhamer, M and Enson, J (1998) Sustainable design for small systems. Paper presented in first international symposium on Technology, Operations and Economics of providing safe drinking water in small systems. World Health Organisation 1998.

Third ADB Water Supply & Sanitation Project Sri Lanka (2005), By laws for the Management of Rural Water Supply systems in Sri Lanka, NORAD(Package C) 2005.

UNDP (2004), **Hands On: Gift from the Sky - Sri Lanka**, United Nations Development Programme (online) <http://www.tve.org/ho/doc.cfm?aid=1635&lang=English> [accessed on 12 September 2006]

Versfeld, D B (1995) Participatory catchment management - an opportunity for Southern Africa. *Water Science and Technology*, Volume 32, Issues 5-6, Pages 145-151.

Wikipedia (2005) The free encyclopedia Economy of Sri Lanka. (online)[http://cn.wikipedia.org/wiki/Economy\\_of\\_Sri\\_Lanka#Overview](http://cn.wikipedia.org/wiki/Economy_of_Sri_Lanka#Overview) [accessed on 01 September 2006]

Woldemeskel, B. B. (2006) Evaluation of water supply systems in selected urban poor area of Adis Ababa, Ethiopia, UNESCO-IHE Msc Thesis MWI-2006

World Bank (2002) Rural Water Supply toolkits for projects, Washington DC, USA

World Bank (2003) Project appraisal report, Second community water supply and Sanitation project. (online)

[Wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2003/05/17/000094946\\_03050804031616/Rendered/PDF/multi0page.pdf](http://Wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2003/05/17/000094946_03050804031616/Rendered/PDF/multi0page.pdf) [accessed on 12 September 2006]

World Bank (2004) Water Supply and Sanitation. Rural Water Supply and Sanitation: Links to Demand Responsive Approach (DRA 24, 2004)

# **ANNEX**



**ANNEX-A: Questionnaires****A.1-Questionnaire for household survey**

Local Authority area ..... Date.....  
Small Town .....  
Type of system.....  
Year of completion.....

**General quotations**

1. How many people living in your house?
2. Who take care of water supply at house?
3. What is your monthly income?

**Technical****1. What do you think about water quality?**

- a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. How often is water supply?**

- a. 24h b. Less than 12h c. Less than 6h d. Less than 3h e. non

**3. What is the distance to the water point from your home?**

- a. 0 m b. Less than 20m c. Less than 35m d. Less than 50m e. More than 50m

**4. What do you think about available quantity of water?**

(Frequency of supply)

- a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**5. How many hour you are receiving water per day?**

- a. 24h b. Less than 12h c. Less than 6h d. Less than 3h e. non

**6. What do you think about pressure?**

- a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

***Institutional*****1. Do you satisfied with the water supply system?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Do you satisfied with the formation of water user committee?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. Women membership in water users committee?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Are you satisfied the frequency of meeting of O & M authority officers to discuss consumer problems?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**5. Are you satisfying with the way of publishing of accounts of O & M authority?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**6. Dose O & M authority have regulations on O & M activities? And are you satisfied on it?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

***A-3 Social*****1. What is your feeling on ownership of your water supply system?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Do you satisfied with arrangement of general meetings by O & M authority with all consumers?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. Do you satisfied with the system of informing planned major repairs/breakdowns in advance?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. How they arrange to get your help for common operation and maintenance activities?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Financial**

**1. How much do you pay for water monthly?**

a. Rs 100 b. Rs 125 c. Rs 150 d. Rs200 e. More than Rs 200

**2. Do you satisfied with the water tariff?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. Are you satisfying with accuracy of billing information?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Is payment system familiar and friendly to you?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**5. Do you satisfying with updated billing information after every payment?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**6. Do you satisfying with actions taken for water saving measures by O & M authority?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Environmental**

**1. Do you satisfied with catchments preservation activities doing by O & M authority?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Do you satisfied with cleanness in treatment plant, reservoir etc?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. Do you satisfied with cleanness in water points?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Table A.1.1-Criteria for analyzing questions in household survey**

| <b>Criteria 1<br/>(General)</b> | <b>Criteria 2<br/>(Supply hrs.)</b> | <b>Criteria 3<br/>(Distance}</b> | <b>Criteria 4<br/>(Tariff)</b> | <b>Score</b> |
|---------------------------------|-------------------------------------|----------------------------------|--------------------------------|--------------|
| Very good                       | 24 hours                            | 0 m                              | Rs.100                         | 100          |
| Good                            | Less than 12 hrs                    | Less than 20 m                   | Rs.125                         | 75           |
| Satisfactory                    | Less than 6 hrs                     | Less than 35 m                   | Rs.150                         | 50           |
| Poor                            | Less than 3 hrs                     | Less than 50 m                   | Rs.250                         | 25           |
| Very poor                       | Non                                 | More than 50 m                   | >Rs.200                        | 00           |



**A.2-Questionnaire for O&M authority**

Local Authority area ..... Date.....  
Small Town .....  
Type of system.....  
Year of completion.....

**General quotations**

1. How many number of households within the small town area?
2. How many water connections within the small town?
3. How old your system?

**Technical****1. What water quality parameters are checking frequently? And what are those?**

- a. all including heavy metals b. Coli form ,e-coli and turbidity c. Coli form & E coli  
d. Only turbidity e. none

**2. How long taking to correct the quality after receiving reports?**

- a. Immediately b. After one week c. After one month d. After receiving next report e.  
No action taking

**3. What is the quantity supplying per average household per day?**

- a. 0.6 m<sup>3</sup> b. 0.4 m<sup>3</sup> c. 0.2 m<sup>3</sup> d. 0.1 m<sup>3</sup> e. Less than 0.1 m<sup>3</sup>

**4. What is the minimum residual pressure at consumer?**

- a. 20mwc b.15mwc c. 10mwc d. 6mwc e. Less than 6mwc

**5. How much are the system water losses?**

- a. 15% b. 20% c. 25% d. 35% e. More than 35 %

**6. What is the duration of water supply per day?**

- a.24h b. Less than 12h c. Less than 6h d. Less than 3h e. non

**Table A.2.1-Criteria for analyzing questions in O&M authority survey -Technical**

| <b>Criteria 1<br/>(Water Quality)</b> | <b>Criteria 2<br/>(Water Quality<br/>monitoring)</b> | <b>Criteria 3<br/>(Quantity<br/>supply)</b> | <b>Criteria 4<br/>(Residual<br/>pressure)</b> |
|---------------------------------------|--|---|---|
| all including heavy metals            | Immediately  | 0.6 m3                                      | 20 mwc  |
| Coli form ,e-coli and turbidity       | After one week                                       | 0.4 m3                                      | 10 mwc  |
| Coli form & E coli                    | After one month                                      | 0.2 m3                                      | 15 mwc  |
| Only turbidity                        | After receiving next report                          | 0.1 m3                                      | 6 mwc   |
| none                                  | No action taking                                     | Less than 0.1 m3                            | Less than 6 mwc                               |

| <b>Criteria 5<br/>(System losses)</b> | <b>Criteria 6<br/>(Supply hrs.)</b> | <b>Score</b> |
|---------------------------------------|-------------------------------------|--------------|
| 15%                                   | 24 hours                            | 100          |
| 20%                                   | Less than 12 hrs                    | 75           |
| 25%                                   | Less than 6 hrs                     | 50           |
| 35%                                   | Less than 3 hrs                     | 25           |
| More than 35%                         | Non                                 | 00           |

***Institutional*****1. What is the coverage from your water supply system?**

- a. 100 % b. 80 % c. 50 % d. 25 % e. Less than 25 %

**2. How long you are taking to attend act on consumer complains?**

- a. Immediately b. After one day c. After one week d .After one month e. No fixed time period

**3. Do you have systems to Record keeping, for break downs, consumer complains, stores, accounts etc?**

- a. Yes for all b. Only for consumer complains, accounts and stores c. Only for consumer complains and stores d. Only for Accounts e. None

**4. How frequent meet an O& M authority officers?**

- a. Weekly b. By weekly c. monthly d. Every six months e. Annually

**5. What are the Actions taken to show transparency of transactions/accounts to consumers?**

- a. Weekly b. By weekly c. monthly d. Every six months e. Annually

**6. Do you have billing and collection system? And how is it consumer friendly?**

a. Yes, no complains at all b. Yes, complains about from 25 % c. Yes, complains about from 50 % d. Yes, complains about from 75 % e. Yes, always complains

**7. How works your rules and regulations for water thereat and disconnections of illegal connections?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**8. Do you satisfied with percentage of women membership in water users committee?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Table A.2.2-Criteria for analyzing questions O&M authority -Institutional**

| <b>Criteria 1<br/>(Coverage)</b> | <b>Criteria 2<br/>(Consumer complains)</b> | <b>Criteria 3<br/>(Record keeping)</b>  | <b>Criteria 4<br/>(Meeting of O&amp; M officers and on transparency)</b> |
|----------------------------------|--|---|--|
| 100%                             | Immediately                                | For all                                 | Weekly   |
| 80%                              | After one day                              | Consumer complains, accounts and stores | By weekly  |
| 50%                              | After one week                             | Consumer complains, and stores          | Monthly  |
| 25%                              | After one month                            | Only for accounts                       | Every six months   |
| Less than 25%                    | No fixed time period                       | None                                    | Annually   |

| <b>Criteria 5<br/>(Billing and collection)</b> | <b>Criteria 6<br/>(On regulations and gender)</b> | <b>Score</b> |
|--|---|--------------|
| Yes, no complains                              | Very good   | 100          |
| Yes, 25% complains                             | Good  | 75           |
| Yes, 50% complains                             | Satisfactory                                      | 50           |
| Yes, 75% complains                             | Poor  | 25           |
| Yes, always complains                          | Very poor   | 00           |

**Social****1. How frequent arrange consumer meetings to discuss their problems?**

- a. Weekly b. By weekly c. monthly d. Every six months e. Annually

**2. What are the actions taken to inform to consumers on planned major repairs/breakdowns in advance?**

- a. By announcements and hand bills b. By announcements c. By hand bills d. Notice at office e. None

**3. Do you have any system to getting involvement of consumers for common O&M activities?**

- a. yes, always b. yes, some times c. frequently d. not always e. None

**Table A.2.3-Criteria for analyzing questions in O&M authority -Social**

| <b>Criteria 1<br/>(Consumer meetings)</b> | <b>Criteria 2<br/>(Break downs)</b> | <b>Criteria 3<br/>(Consumers for common activities)</b> | <b>Score</b> |
|---|-------------------------------------|---|--------------|
| Weekly                                    | By announcement and hand bills      | Yes, always   | 100          |
| By weekly                                 | By announcement                     | Yes, some times   | 75           |
| Monthly                                   | By hand bills                       | frequently  | 50           |
| Every six months                          | Notice at office                    | Not always  | 25           |
| Annually                                  | None                                | None  | 00           |

**Financial****1. What is the billing and collection ratio?**

- a. 100 % b. 80 % c. 50 % d. 25 % e. Less than 25 %

**2. Do you have programme for annual auditing of accounts and publish the report?**

- a. yes, always b. yes, some times c. frequently d. not always e. None

**3. Do you satisfying with actions taken for water saving measures?**

- a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

#### A.2.4-Criteria for analyzing questions in O&M authority survey -Financial

| Criteria 1<br>(Billing &<br>Collection) | Criteria 2<br>(Annual<br>auditing) | Criteria 3<br>(Water saving<br>measures) | Score |
|---|------------------------------------|--|-------|
| 100%                                    | Yes, always                        | Very good                                | 100   |
| 80%                                     | Yes, some times                    | Good                                     | 75    |
| 50%                                     | frequently                         | Satisfactory                             | 50    |
| 25%                                     | Not always                         | Poor                                     | 25    |
| Less than 25%                           | None                               | Very poor                                | 00    |

#### *Environmental*

##### 1. How does work the catchments preservation programmes?

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

##### 2. Is environment in treatment plant site, reservoir sites are clean?

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

##### 3. How does work the waste management around water points/sources?

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Table A.2.5-Criteria for analyzing questions in O&M authority survey  
Environmental**

| Criteria     | Score |
|--------------|-------|
| Very good    | 100   |
| Good         | 75    |
| Satisfactory | 50    |
| Poor         | 25    |
| Very poor    | 00    |

***On project implementation arrangement***

**1. Do you agree on selection criteria of small towns for implementation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Do you satisfied with selection criteria of NGOs for community mobilisation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. What is your idea about method used to enter to the community in small towns?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Do you agree on criteria for selection of water supply option?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**5. Do you satisfied with strategy used for finalising the water supply option?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**6. Do you agree with construction arrangement of water supply system?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**7. Did your staff get enough training on technical and financial activities for O & M?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**8. Do you agree with the handing over process of WSS to O&M authority?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**TableA.2.6-Criteria for analyzing questions in O&M authority survey –Project implementation**

| Criteria     | Score |
|--------------|-------|
| Very good    | 100   |
| Good         | 75    |
| Satisfactory | 50    |
| Poor         | 25    |
| Very poor    | 00    |

***On institutional arrangement.*****1. Do you satisfied with present institutional set-up in your organisation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Do you satisfied with present regulations for smooth functioning of water supply system?**

(Eg. For illegal connections, disconnections, billing and collections etc.)

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. Are you satisfying with continuation of training programmes for your staff?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Do you have enough logistic facilities for smooth functioning of the scheme?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Table A.2.7-Criteria for analyzing questions in O&M authority survey – Institutional arrangement**

| Criteria     | Score |
|--------------|-------|
| Very good    | 100   |
| Good         | 75    |
| Satisfactory | 50    |
| Poor         | 25    |
| Very poor    | 00    |

**On backup support system.**

**1. Do you satisfied with present institutional set-up for backup support system?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Are your organisation is getting enough technical support from other institutions for O& m activities?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. How are the link between your organisation and other organisations?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Do you satisfied with the coordination arrangement between your organisation and other institutions?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**5. Do you have enough maintenance fund and loan facilities to get help in emergency situation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**TableA.2.8-Criteria for analyzing questions in O&M authority survey –Backup support system**

| Criteria     | Score |
|--------------|-------|
| Very good    | 100   |
| Good         | 75    |
| Satisfactory | 50    |
| Poor         | 25    |
| Very poor    | 00    |



**A.3-Questionnaire for NGOs**

Local Authority area ..... Date.....

Small Town attended .....

Name of the organization.....

***On project implementation arrangement.*****1. Do you agree on selection criteria of small towns for implementation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Do you satisfied with selection criteria of NGOs for community mobilisation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. What is your idea about method used to enter to the community in small towns?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Do you agree on criteria for selection of water supply option?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**5. Do you satisfied with strategy used for finalising the water supply option?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**6. Do you agree with construction arrangement of water supply system?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**7. Did your staff get enough training on project activities and community mobilisation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**8. Do you agree with the handing over process of Water supply system to O&M authority?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Table A.3.1-Criteria for analyzing questions in NGO survey-Project implementation**

| <b>Criteria</b> | <b>Score</b> |
|-----------------|--------------|
| Very good       | 100          |
| Good            | 75           |
| Satisfactory    | 50           |
| Poor            | 25           |
| Very poor       | 00           |

**A.4-Local authority questionnaire**

Local Authority area .....

Small Town attended .....

Are your local authority is managing any small town water supply system?

***D-1 On project implementation arrangement*****1. Do you agree on selection criteria of small towns for implementation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Do you satisfied with selection criteria of NGOs for community mobilisation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. What is your idea about method used to enter to the community in small towns?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Do you agree on criteria for selection of water supply option?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**5. Do you satisfied with strategy used for finalising the water supply option?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**6. Do you agree with construction arrangement of water supply system?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**7. Did your staff get enough training on project activities?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**8. Do you agree with the handing over process of Water supply system to O&M authority?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Table A.4.1-Criteria for analyzing questions in local authority survey –Project implementation**

| Criteria     | Score |
|--------------|-------|
| Very good    | 100   |
| Good         | 75    |
| Satisfactory | 50    |
| Poor         | 25    |
| Very poor    | 00    |

***On institutional arrangement.***

**1. Do you satisfied with present institutional set-up in CBO ?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Do you agree with regulations in CBO for smooth functioning of water supply system? (Eg. For illegal connections, disconnections, billing and collections etc.)**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. Do you satisfy on training programmes for CBO?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Is there enough logistic facilities for smooth functioning of the scheme?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Table A.4.2-Criteria for analyzing questions in local authority survey – Institutional arrangement**

| Criteria     | Score |
|--------------|-------|
| Very good    | 100   |
| Good         | 75    |
| Satisfactory | 50    |
| Poor         | 25    |
| Very poor    | 00    |

***On backup support system.***

**1. Do you satisfied with present institutional set-up for backup support system?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Are your organisation is giving enough backup support to CBO for O& M activities?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. The link between CBO and your organisation and other organisations is?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Do you satisfied with the coordination arrangement between CBO, your organisation and other institutions?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**5. Do you agree with the setup of maintenance fund and loan facilities to give help at emergency situation to CBO?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Table A.4.3-Criteria for analyzing questions in local authority survey –Backup support system**

| Criteria     | Score |
|--------------|-------|
| Very good    | 100   |
| Good         | 75    |
| Satisfactory | 50    |
| Poor         | 25    |
| Very poor    | 00    |

**A.5-Project Implementation Unit questionnaire**

District .....

Local Authority area .....

Small Town attended .....

***On project implementation arrangement*****1. Do you agree on selection criteria of small towns for implementation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Do you satisfied with selection criteria of NGOs for community mobilisation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. What is your idea about method used to enter to the community in small towns?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Do you agree on criteria for selection of water supply option?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**5. Do you satisfied with strategy used for finalising the water supply option?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**6. Do you agree with construction arrangement of water supply system?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**7. Did your staff get enough training on project activities?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**8. Do you agree with the handing over process of Water supply system to O&M authority?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Table A.5.1-Criteria for analyzing questions in PIU survey –Project implementation**

| <b>Criteria</b> | <b>Score</b> |
|-----------------|--------------|
| Very good       | 100          |
| Good            | 75           |
| Satisfactory    | 50           |
| Poor            | 25           |
| Very poor       | 00           |

**A.6-Project Management Unit questionnaire**

Date .....

***On project implementation arrangement*****1. Do you agree on selection criteria of small towns for implementation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Do you satisfied with selection criteria of NGOs for community mobilisation?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. What is your idea about method used to enter to the community in small towns?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Do you agree on criteria for selection of water supply option?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**5. Do you satisfied with strategy used for finalising the water supply option?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**6. Do you agree with construction arrangement of water supply system?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**7. Did your staff get enough training on project activities?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**8. Do you agree with the handing over process of Water supply system to O&M authority?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Table A.6.1-Criteria for analyzing questions in PMU survey –Project implementation**

| Criteria     | Score |
|--------------|-------|
| Very good    | 100   |
| Good         | 75    |
| Satisfactory | 50    |
| Poor         | 25    |
| Very poor    | 00    |



**A.7-NWSDB regional offices questionnaire**

District .....

Local Authority area .....

Small Town .....

***On institutional arrangement.*****1. Do you satisfied with present institutional set-up in CBO/LA ?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Is there enough regulations for smooth functioning of water supply system?**

(Eg. For illegal connections, disconnections, billing and collections etc.)

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. Do you satisfy with continuing of training programmes for CBO/LA?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Is there any logistic facilities for smooth functioning of the scheme?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

***On backup support system.*****1. Do you satisfied with present institutional set-up for backup support system?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**2. Do you satisfying with the support giving by your organisation for backup support to CBO for O& M activities?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**3. Is there strong link between CBO, your organisation and other organisations?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**4. Do you satisfied with the coordination arrangement between CBO, your organisation and other institutions?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**5. Do you satisfied with the available maintenance fund and loan facilities to give help at emergency situation to CBO/LA?**

a. Very Good b. Good c. Satisfactory d. Poor e. Very poor

**Table A.7.1-Criteria for analyzing questions in NWSDB survey –Institutional arrangement and backup support system**

| <b>Criteria</b> | <b>Score</b> |
|-----------------|--------------|
| Very good       | 100          |
| Good            | 75           |
| Satisfactory    | 50           |
| Poor            | 25           |
| Very poor       | 00           |

**ANNEX-B: Criteria for selection of four small town water supply systems**

1. Annual average rain fall (Total marks 10)
  - Below 1500 mm (Dry) - 05
  - Above 1500 mm (Wet) – 05
2. Management Authority(Total marks 10)
  - Community Based Organization - 10
  - Local Authority - 07
  - NWSDB - 05
3. Technology(Total marks 10)
  - Pumping - 05
  - Gravity - 05
4. Population(Total marks 10)  
(According to the RWS policy)
  - 4001 to 6000 - 10
  - 3001 to 4000 - 07
  - 2001 to 3000 – 05
5. Coverage(Total marks 10)
  - More than 76% - 10
  - 51% to 75% - 7.5
  - 26% to 50% - 5.0
  - Below 25% - 2.5
6. Water consumption per day per family (Total marks 10)
  - More than 600 liters- 10
  - 401 l to 600 l - 7.5
  - 201 l to 400 l - 5.0
  - Below 200 l - 2.5
7. Available Treatment facilities(Total marks 10)
  - Full Treatment - 10
  - Partial treatment - 7.5
  - Chlorination only - 5.0
  - No treatment - 2.0
8. Action taken for water source protection (Total marks 10)
  - Action already taken - 10
  - Action on going - 7.0
  - Non - 5.0

9. Affordability of water tariff (Total marks 10)  
(According to the percentage of income of family)

- 0% to 2.5 % - 10
- 2.6% to 5.0%- 7
- More than 5% - 5

10. Capacity of water source to meet the required demand (Total marks 10)

- Above the required demand - 10
- Meet the required demand - 7
- Below the required demand - 5

**ANNEX-C: Primary data of all small town water supply systems in six districts****Table C.1: Primary data in Kalutara district**

| District | Annual Ave. Rainfall(mm) | PS area       | Small Town    | Water Source    | Capacity Of source         | O&M Authority            | Population | Population Served | Technology | Treatment | No.of Connections | Tariff per month | Consumption Per day/family |
|----------|--------------------------|---------------|---------------|-----------------|----------------------------|--------------------------|------------|-------------------|------------|-----------|-------------------|------------------|----------------------------|
| Kalutara | 2500-3000                | Bulathsinhala | Bulathsinhala | Paniella Stream | Dry 20 lps<br>Wet 24 lps   | CBO                      | 4095       | 2730              | Gravity    | RF/Ch     | 819               | Rs 135           | 550 liters                 |
|          |                          |               | Agalawatta    | Baduraliya      | Labudola Stream            | Dry 21 lps<br>Wet 23 lps | CBO        | 3095              | 2675       | Gravity   | RF/Ch             | 619              | Rs.125                     |
|          |                          | Walalawita    | Meegahatenna  | Palawatta River | Dry 201 lps<br>Wet 256 lps | CBO                      | 7170       | 1134              | Pumping    | RF/SSF/Ch | 267               | Rs.140           | 600 liters                 |

**Table C.2: Primary data in Kegalle district**

| District | Annual Ave. Rainfall(mm) | PS area    | Small Town    | Water Source    | Capacity of source             | O&M Authority | Population | Population Served | Technology | Treatment   | No.of Connections | Tariff per month | Consumption Per day/family |
|----------|--------------------------|------------|---------------|-----------------|--------------------------------|---------------|------------|-------------------|------------|-------------|-------------------|------------------|----------------------------|
| Kegalle  | 2500-3000                | Galigamuwa | Kotiyakumbura | Deep bore hole  | 648 m3/d                       | CBO           | 3040       | 2592              | Pumping    | Ch          | 417               | Rs.264           | 1000 lit                   |
|          |                          |            | Dewalegama    | →               | Covered by greater Kegalle WSS |               |            |                   |            | F/Treatment |                   |                  |                            |
|          |                          | Warakapola | Dedigama      | Deep bore hole  | 560 m3/d                       | CBO           | 2950       | 2600              | Pumping    | Ch          | 190               | Rs.206           | 1000 lit                   |
|          |                          | Rambukkana | Hirwadunna    | Ma oya River    | 300 m3/d                       | NWSDB         | 1269       | 1144              | Pumping    | F/Treatment | 286               | NWSDB            | 1000 lit                   |
|          |                          | Yatiantota | Kitulgala     | Liyan oya River | 300 m3/d                       | CBO           | 3000       | 2800              | Gravity    | Ch          | 560               | Rs.130           | 1000 lit                   |

**Table C.3: Primary data in Puttalam district**

| District | Annual Ave. Rainfall(mm) | PS area         | Small Town      | Water Source    | Capacity of source                                      | O&M Authority   | Population | Population Served | Technology | Treatment   | No.of Connections | Tariff per month | Water consumption Per day/family |         |
|----------|--------------------------|-----------------|-----------------|-----------------|---|---|------------|-------------------|------------|-------------|-------------------|------------------|----------------------------------|---------|
| Puttalam | 750-1500                 | Karuwalagaswewa | Saliyawewa      | Kala oya River  | Dry1.72mm <sup>3</sup> /d<br>Wet5.18 mm <sup>3</sup> /d | CBO   | 6195       | 5500              | Pumping    | F/Treatment | 1100              | Rs.250           | 700 lit                          |         |
|          |                          |                 | Wennapuwa       | Kirimetiyan     | Deep bore hole  | 310 m <sup>3</sup> /d                                   | CBO        | 2565              | 3000       | Pumping     | Ch                | 600              | Rs.250                           | 600 lit |
|          |                          |                 | Dankotuwa       | Ma oya          | 300 m <sup>3</sup> /d                                   | NWSDB   | 8000       | 8000              | Pumping    | F/Treatment | 1600              | Rs 150           | 600 lit                          |         |
|          |                          |                 | Arachchikattuwa | Arachchikattuwa | Deep bore hole  | 360 m <sup>3</sup> /d                                   | CBO        | 5023              | 5023       | Pumping     | Ch                | 1200             | Rs 250                           | 600 lit |
|          |                          |                 | Nattandiya      | Mahawewa        | Kadupiti oya stream                                     | Dry1.44mm <sup>3</sup> /d<br>Wet3.6 mm <sup>3</sup> /d  | CBO        | 4500              | 2100       | Pumping     | F/Treatment       | 980              | Rs 150                           | 500 lit |
|          |                          |                 | Puttalam        | Manathiv        | Mee oya River   | Dry1.36mm <sup>3</sup> /d<br>Wet4.46 mm <sup>3</sup> /d | NWSDB      | 5401              | 5401       | Pumping     | F/Treatment       | 1165             | Rs 150                           | 425 lit |

**Table C.4: Primary data in Monaragala district**

| District   | Annual Ave. Rainfall(mm) | PS area       | Small Town    | Water Source            | Capacity of source      | O&M Authority | Population | Population Served | Technology | Treatment        | No.of Connections | Tariff per month | Water consumption Per day/family |
|------------|--------------------------|---------------|---------------|-------------------------|-------------------------|---------------|------------|-------------------|------------|------------------|-------------------|------------------|----------------------------------|
| Monaragala | 1500-2000                | Buttala       | Okkampitiya   | Kumbukkan oya River     | 4320 m <sup>3</sup> /d  | NWSDB         | 8500       | 7653              | Pumping    | River bed filter | 1530              | NWSDB            | 650 lit                          |
|            |                          | Tanamalwila   | Kiribban ara  | Kiribbnara stream       | 1540m <sup>3</sup> /d   | CBO           | 3675       | 2550              | Pumping    | Aeration/RF      | 570               | Rs.360           | 525 lit                          |
|            |                          | Bibila        | Bibila        | Nayakkandura oya stream | 1884 m <sup>3</sup> /d  | NWSDB         | 8140       | 8230              | Gravity    | SSF              | 1246              | Rs. 150          | 480 lit                          |
|            |                          | Siyabalanduwa | Siyabalanduwa | Hedaoya stream          | 75485 m <sup>3</sup> /d | NWSDB         | 5040       | 3250              | Pumping    | SSF              | 650               | Rs. 150          | 700 lit                          |
|            |                          | Sewanagala    | Sewanagala    | Walawe River            | 84320 m <sup>3</sup> /d | NWSDB         | 12399      | 5435              | Gravity    | F/Treatment      | 1091              | Rs. 150          | 880 lit                          |

Table C.5: Primary data in Anuradapura district

| District     | Annual Ave. Rainfall(mm) | PS area           | Small Town     | Water Source                        | Capacity of source    | O&M Authority | Population Served | Population Served | Technology | Treatment | No. of Connections | Tariff per month | Water consumption Per day/family |
|--------------|--------------------------|-------------------|----------------|-------------------------------------|-----------------------|---------------|-------------------|-------------------|------------|-----------|--------------------|------------------|----------------------------------|
| Anuradhapura | 750-1500                 | NGP(C)            | Pemaduwa       | Deep & shallow bore holes           | 686 m <sup>3</sup> /d | CBO           | 1538              | 1538              | Pumping    | Ch        | 307                | Rs.365           | 600 lit                          |
|              |                          | Galenbindunuwewa  | Dutuwewa       | Deep & shallow bore holes           | 636m <sup>3</sup> /d  | CBO           | 5360              | 2900              | Pumping    | Ch        | 580                | Rs.290           | 600 lit                          |
|              |                          | Padaviya          | Prakramapura   | Deep bore holes                     | 660 m <sup>3</sup> /d | CBO           | 3250              | 3250              | Pumping    | Ch        | 650                | Rs.290           | 600 lit                          |
|              |                          | Kebethigollawa    | Kebethigollawa | Deep bore holes                     | 468m <sup>3</sup> /d  | NWSDB         | 2704              | 2704              | Pumping    | Ch        | 541                | Rs.150           |                                  |
|              |                          | Kekirawa          | Habarana       | Deep bore holes                     | 652m <sup>3</sup> /d  | NWSDB         | 3800              | 3800              | Pumping    | Ch        | 760                | Rs.150           | 600 lit                          |
|              |                          | Rambewa           | Rambewa        |                                     |                       |               |                   |                   |            |           |                    |                  |                                  |
|              |                          | NGP(E)            | Nachchaduwa    |                                     |                       |               |                   |                   |            |           |                    |                  |                                  |
|              |                          | Mihintale         | Mihintale      |                                     |                       |               |                   |                   |            |           |                    |                  |                                  |
|              |                          | Talawa/Tambuttega | Talawa         |                                     |                       |               |                   |                   |            |           |                    |                  |                                  |
|              |                          |                   |                | Covered by Greater Anuradhapura WSS |                       |               |                   |                   |            |           |                    |                  |                                  |



Table C.6: Primary data in Hambantota district

| District   | Annual Ave. Rainfall(mm) | PS area         | Small Town       | Water Source                        | Capacity of source                  | O&M Authority | Population | Population Served | Technology | Treatment          | No. of Connections per month | Tariff | Consumption Per day/family |  |
|------------|--------------------------|-----------------|------------------|-------------------------------------|-------------------------------------|---------------|------------|-------------------|------------|--------------------|------------------------------|--------|----------------------------|--|
| Hambantota | 750-1500                 | Weeraketiya     | Okewela          | Deep bore hole                      | 696 m3/d                            | CBO           | 1375       | 1375              | Pumping    | Aeration/RF        | 275                          | Rs.295 | 600 lit                    |  |
|            |                          |                 | Julampitiya      | Spring                              | 152 m3/d                            | CBO           | 2980       | 1205              | Pumping    | Aeration/RF        | 250                          | Rs.295 | 600 lit                    |  |
|            |                          |                 | Wekandawala      | Deep bore hole/Spring               | 432 m3/d                            | CBO           | 1790       | 1500              | Pumping    | Aeration/RF        | 300                          | Rs.295 | 600 lit                    |  |
|            |                          | Katuwana        | Middeniya        | Deep bore hole/Spring               | 422 m3/d                            | PS            | 8653       | 7500              | Pumping    | Aeration/RF/Ch     | 1500                         | Rs.295 | 600 lit                    |  |
|            |                          | Ambalantota     | Barawakumbuka    | Shallow bore holes                  | 1812 m3/d                           | CBO           | 6000       | 4050              | Pumping    | lom removal/Ch     | 800                          | Rs.295 | 430 lit                    |  |
|            |                          |                 | Deniya/Pingama   | Deep bore hole                      | 200 m3/d                            | CBO           | 1945       | 1125              | Pumping    | lom removal/Ch     | 225                          | Rs.325 | 380 lit                    |  |
|            |                          |                 | Dodakoggala      | Deep bore hole                      | 576 m3/d                            | CBO           | 2650       | 1500              | Pumping    | Ch                 | 300                          | Rs.325 | 400 lit                    |  |
|            |                          | Beliatta        | Galagama         | Deep bore hole                      | 1500 m3/d                           | CBO           | 2137       | 2000              | Pumping    | lom removal/Ch     | 400                          | Rs.325 | 402 lit                    |  |
|            |                          |                 | Getamanna        | Deep bore hole                      | 1500 m3/d                           | CBO           | 3000       | 1500              | Pumping    | lom removal/Ch     | 600                          | Rs.325 | 330 lit                    |  |
|            |                          | Hambantota      | Bandaginiya      | Bradagioniya Tank                   | 1500 m3/d                           | CBO           | 5648       | 5805              | Pumping    | Aeration/RF/SS /Ch | 1161                         | Rs.255 | 1000 lit                   |  |
|            |                          |                 | Mahagalwewa      | Mahagalwewa Tank                    | 1150 m3/d                           | CBO           | 3100       | 2884              | Pumping    | Aeration/RF/SS     | 620                          | Rs.255 | 1000 lit                   |  |
|            |                          |                 | Siyambalagaswila | Walawa River                        | 1500 m3/d                           | CBO           | 7290       | 7210              | Pumping    | Aeration/RF/SS /Ch | 1442                         | Rs.320 | 1000 lit                   |  |
|            |                          |                 |                  | Suruwirugama                        | → Extension covered by urban scheme |               |            |                   |            |                    |                              |        |                            |  |
|            |                          | Tangalla        | Aluthgoda        | Deep bore hole                      | 198 m3/d                            | CBO           | 2225       | 2040              | Pumping    | lom removal/Ch     | 408                          | Rs.295 | 1000 lit                   |  |
|            |                          |                 | Witamdeniya      | Deep bore hole                      | 693 m3/d                            | CBO           | 4657       | 4595              | Pumping    | lom removal/Ch     | 919                          | Rs.295 | 500 lit                    |  |
|            |                          | Angunakolapeles | Wekamulla        | Uruboku oya/Stream                  | 1800 m3/d                           | CBO           | 5535       | 5215              | Pumping    | Aera/RF/SF         | 1043                         | Rs.204 | 500 lit                    |  |
|            |                          |                 | Talawa           | Kachchgalwewa Tank                  | 1000 m3/d                           | CBO           | 7500       | 7500              | Pumping    | Aera/RF            | 1500                         | Rs.204 | 500 lit                    |  |
|            |                          | Lunugamwehera   | Beralihela       | → Extension covered by urban scheme |                                     |               |            |                   |            |                    |                              |        |                            |  |

## ANNEX-D: Primary data analysis of all small town water supply systems

Table D.1: Primary data analysis

| District     | Dry/Wet Districts | Serial No. | Small Town     | Rainfall O&M |    | Technology | Population | Coverage | Water consumption | Treatment Source |    | Affordability | Capacity of source | Total Rank      |
|--------------|-------------------|------------|----------------|--------------|----|------------|------------|----------|-------------------|------------------|----|---------------|--------------------|-----------------|
|              |                   |            |                | Authority    |    |            |            |          |                   | protection       |    |               |                    |                 |
| Kalutara     | Wet district      | 1          | Bulathsinghla  | 5            | 10 | 5          | 10         | 7.5      | 7.5               | 7.5              | 10 | 10            | 7                  | 79.5            |
|              |                   | 2          | Baduraiya      | 5            | 10 | 5          | 7          | 10       | 7.5               | 7.5              | 10 | 10            | 7                  | 79              |
|              |                   | 3          | Meegahatenna   | 5            | 10 | 5          | 10         | 2.5      | 10                | 7.5              | 5  | 10            | 10                 | 75              |
| Kegalle      | Wet district      | 4          | Kotiyakumbura  | 5            | 10 | 5          | 7          | 10       | 10                | 5                | 5  | 7             | 10                 | 74              |
|              |                   | 5          | Dewalegama     | 5            | 5  | 5          | 5          | 10       | 10                | 10               | 7  | 10            | 10                 | 77              |
|              |                   | 6          | Dedigama       | 5            | 10 | 5          | 5          | 10       | 10                | 5                | 10 | 10            | 10                 | 80 1st          |
|              |                   | 7          | Hiriwadunna    | 5            | 5  | 5          | 5          | 10       | 10                | 10               | 5  | 7             | 10                 | 72              |
|              |                   | 8          | Kitulgak       | 5            | 10 | 5          | 5          | 10       | 10                | 5                | 10 | 10            | 10                 | 80 2nd          |
|              |                   |            |                |              |    |            |            |          |                   |                  |    |               |                    | in wet district |
| Anuradhapura | Dry district      | 9          | Pemaduwa       | 5            | 10 | 5          | 5          | 10       | 10                | 5                | 5  | 7             | 10                 | 72              |
|              |                   | 10         | Dutuwewa       | 5            | 10 | 5          | 10         | 7.5      | 10                | 5                | 5  | 7             | 10                 | 74.5            |
|              |                   | 11         | Prakramapura   | 5            | 10 | 5          | 7          | 10       | 10                | 5                | 5  | 7             | 10                 | 74              |
|              |                   | 12         | Kebethigollawa | 5            | 5  | 5          | 7          | 10       | 10                | 5                | 5  | 7             | 10                 | 69              |
|              |                   | 13         | Habarana       | 5            | 5  | 5          | 7          | 10       | 10                | 5                | 5  | 7             | 10                 | 69              |
|              |                   | 14         | Rambewa        | 5            | 5  | 5          | 7          | 10       | 10                | 10               | 5  | 10            | 10                 | 77              |
|              |                   | 15         | Nachchaduwa    | 5            | 5  | 5          | 10         | 7.5      | 10                | 10               | 5  | 10            | 10                 | 77.5            |
|              |                   | 16         | Mihintale      | 5            | 5  | 5          | 7          | 10       | 10                | 10               | 5  | 10            | 10                 | 77              |
|              |                   | 17         | Talawa         | 5            | 5  | 5          | 10         | 7.5      | 10                | 10               | 5  | 10            | 10                 | 77.5            |

| District   | Dry/Wet Districts | Serial No. | Small Town      | Rainfall | O&M Authority | Technology | Population | Coverage | Water consumption | Treatment | Source protection | Affordability | Capacity of source | Total Rank |
|------------|-------------------|------------|-----------------|----------|---------------|------------|------------|----------|-------------------|-----------|-------------------|---------------|--------------------|------------|
| Puttalam   | Dry district      | 18         | Sallyawewa      | 5        | 10            | 5          | 10         | 10       | 10                | 10        | 10                | 10            | 10                 | 90 1st     |
|            |                   | 19         | Kirimetiya      | 5        | 10            | 5          | 7          | 10       | 10                | 5         | 10                | 10            | 10                 | 82 2nd     |
|            |                   | 20         | Dankotuwa       | 5        | 5             | 5          | 10         | 10       | 10                | 10        | 5                 | 7             | 10                 | 77         |
|            |                   | 21         | Arachchikattuwa | 5        | 10            | 5          | 10         | 10       | 10                | 5         | 10                | 10            | 5                  | 80         |
|            |                   | 22         | Mahawewa        | 5        | 10            | 5          | 10         | 5        | 7.5               | 10        | 5                 | 7             | 10                 | 74.5       |
|            |                   | 23         | Manathiv        | 5        | 5             | 5          | 10         | 10       | 7.5               | 10        | 5                 | 7             | 10                 | 74.5       |
| Monaragala | Dry district      | 24         | Okkampitiya     | 5        | 5             | 5          | 10         | 10       | 10                | 7.5       | 5                 | 7             | 7                  | 71.5       |
|            |                   | 25         | Kiriibban ara   | 5        | 10            | 5          | 10         | 7.5      | 10                | 7.5       | 5                 | 7             | 7                  | 74         |
|            |                   | 26         | Bibila          | 5        | 5             | 5          | 10         | 10       | 10                | 7.5       | 5                 | 7             | 7                  | 71.5       |
|            |                   | 27         | Siyabalanduwa   | 5        | 5             | 5          | 10         | 7.5      | 10                | 7.5       | 5                 | 7             | 7                  | 69         |
|            |                   | 28         | Sewanagala      | 5        | 5             | 5          | 10         | 5        | 10                | 7.5       | 5                 | 7             | 7                  | 66.5       |

| District   | Dry/Wet Districts | Serial No. | Small Town       | Rainfall |    | O&M Authority | Technology | Population | Coverage |     | Water consumption | Treatment | Source protection | Affordability | Capacity of source | Total Rank |
|------------|-------------------|------------|------------------|----------|----|---------------|------------|------------|----------|-----|-------------------|-----------|-------------------|---------------|--------------------|------------|
|            |                   |            |                  |          |    |               |            |            |          |     |                   |           |                   |               |                    |            |
| Hambantota | Dry district      | 29         | Okewela          | 5        | 10 |               | 5          | 5          | 10       | 10  | 7.5               | 5         | 7                 | 10            | 74.5               |            |
|            |                   | 30         | Julampitiya      | 5        | 10 |               | 5          | 5          | 5        | 10  | 7.5               | 7         | 7                 | 10            | 71.5               |            |
|            |                   | 31         | Wekandawala      | 5        | 10 |               | 5          | 5          | 10       | 10  | 7.5               | 5         | 7                 | 10            | 74.5               |            |
|            |                   | 32         | Middeniya        | 5        | 7  |               | 5          | 10         | 10       | 10  | 7.5               | 5         | 7                 | 5             | 71.5               |            |
|            |                   | 33         | Barawakumbuka    | 5        | 10 |               | 5          | 10         | 7.5      | 10  | 7.5               | 7         | 7                 | 10            | 79                 |            |
|            |                   | 34         | Deniya/Pingama   | 5        | 10 |               | 5          | 5          | 7.5      | 7.5 | 7.5               | 7         | 7                 | 10            | 71.5               |            |
|            |                   | 35         | Dodakoggala      | 5        | 10 |               | 5          | 5          | 7.5      | 7.5 | 5                 | 7         | 7                 | 10            | 69                 |            |
|            |                   | 36         | Galagama         | 5        | 10 |               | 5          | 5          | 10       | 10  | 7.5               | 5         | 7                 | 10            | 74.5               |            |
|            |                   | 37         | Getamanna        | 5        | 10 |               | 5          | 7          | 5        | 5   | 7.5               | 7         | 7                 | 10            | 68.5               |            |
|            |                   | 38         | Bandagiriya      | 5        | 10 |               | 5          | 10         | 10       | 10  | 7.5               | 7         | 7                 | 10            | 81.5               |            |
|            |                   | 39         | Mahagalwewa      | 5        | 10 |               | 5          | 7          | 10       | 10  | 10                | 5         | 7                 | 10            | 79                 |            |
|            |                   | 40         | Siyambalagaswili | 5        | 10 |               | 5          | 10         | 10       | 10  | 7.5               | 7         | 7                 | 10            | 81.5               |            |
|            |                   | 41         | Suruwirugama     | 5        | 5  |               | 5          | 10         | 10       | 5   | 10                | 5         | 7                 | 10            | 72                 |            |
|            |                   | 42         | Aluthgoda        | 5        | 10 |               | 5          | 5          | 10       | 10  | 7.5               | 7         | 7                 | 5             | 71.5               |            |
|            |                   | 43         | Witamdeniya      | 5        | 10 |               | 5          | 10         | 10       | 7.5 | 7.5               | 5         | 7                 | 10            | 77                 |            |
|            |                   | 44         | Wekamulla        | 5        | 10 |               | 5          | 10         | 10       | 7.5 | 10                | 5         | 5                 | 10            | 77.5               |            |
|            |                   | 45         | Talawa           | 5        | 10 |               | 5          | 10         | 10       | 7.5 | 7.5               | 7         | 5                 | 10            | 77                 |            |
|            |                   | 46         | Beralihela       | 5        | 5  |               | 5          | 10         | 10       | 7.5 | 10                | 7         | 7                 | 10            | 76.5               |            |



**ANNEX E: Survey results and calculated scores**

**District -Puttalam**  
**Small Town - Saliyawewa**  
**Household survey**

**On Sustainability dimensions**

**Table E.1: Household technical**  
**Saliyawewa**

| Household No.          | Q1  | Q2  | Q3  | Q4  | Q5  | Q6  |       |
|------------------------|-----|-----|-----|-----|-----|-----|-------|
| 1                      | 75  | 100 | 100 | 100 | 100 | 75  |       |
| 2                      | 75  | 100 | 100 | 100 | 100 | 75  |       |
| 3                      | 100 | 100 | 100 | 75  | 75  | 75  |       |
| 4                      | 75  | 75  | 100 | 100 | 100 | 100 |       |
| 5                      | 100 | 100 | 100 | 100 | 100 | 75  |       |
| 6                      | 50  | 100 | 100 | 75  | 75  | 75  |       |
| 7                      | 100 | 100 | 100 | 100 | 100 | 50  |       |
| 8                      | 75  | 75  | 100 | 50  | 100 | 75  |       |
| 9                      | 75  | 100 | 100 | 100 | 100 | 50  |       |
| 10                     | 75  | 100 | 100 | 100 | 100 | 75  |       |
| 11                     | 75  | 100 | 100 | 100 | 100 | 50  |       |
| 12                     | 75  | 50  | 100 | 75  | 100 | 75  |       |
| 13                     | 100 | 75  | 100 | 50  | 100 | 75  |       |
| 14                     | 75  | 100 | 100 | 100 | 75  | 75  |       |
| 15                     | 100 | 75  | 100 | 100 | 100 | 75  |       |
| 16                     | 75  | 75  | 100 | 75  | 100 | 50  |       |
| 17                     | 75  | 100 | 100 | 100 | 100 | 75  |       |
| 18                     | 50  | 75  | 100 | 75  | 100 | 75  |       |
| 19                     | 75  | 100 | 100 | 100 | 75  | 100 |       |
| 20                     | 75  | 100 | 100 | 75  | 100 | 75  |       |
| 21                     | 100 | 100 | 100 | 75  | 100 | 75  |       |
| 22                     | 75  | 100 | 100 | 100 | 50  | 75  |       |
| 23                     | 100 | 75  | 100 | 100 | 100 | 75  |       |
| 24                     | 75  | 100 | 100 | 100 | 100 | 75  |       |
| 25                     | 75  | 100 | 100 | 100 | 100 | 50  |       |
| <b>Average score</b>   | 80  | 91  | 100 | 89  | 94  | 72  | 526   |
| <b>Overall average</b> |     |     |     |     |     |     | 87.67 |

**Table E.2: Household institutional  
Saliyawewa**

| Household No.          | Q1 | Q2 | Q3 | Q4  | Q5 | Q6 |       |
|------------------------|----|----|----|-----|----|----|-------|
| 1                      | 75 | 75 | 50 | 50  | 25 | 50 |       |
| 2                      | 50 | 50 | 50 | 25  | 25 | 50 |       |
| 3                      | 75 | 75 | 50 | 50  | 25 | 25 |       |
| 4                      | 50 | 50 | 50 | 25  | 25 | 50 |       |
| 5                      | 75 | 75 | 50 | 50  | 50 | 50 |       |
| 6                      | 50 | 75 | 50 | 25  | 25 | 25 |       |
| 7                      | 75 | 50 | 50 | 50  | 75 | 50 |       |
| 8                      | 50 | 75 | 50 | 100 | 25 | 50 |       |
| 9                      | 50 | 50 | 50 | 50  | 25 | 50 |       |
| 10                     | 25 | 50 | 50 | 50  | 25 | 25 |       |
| 11                     | 75 | 50 | 50 | 50  | 25 | 50 |       |
| 12                     | 75 | 50 | 50 | 25  | 25 | 25 |       |
| 13                     | 50 | 75 | 50 | 25  | 25 | 25 |       |
| 14                     | 50 | 75 | 50 | 50  | 25 | 25 |       |
| 15                     | 75 | 75 | 50 | 25  | 50 | 50 |       |
| 16                     | 75 | 75 | 50 | 25  | 50 | 50 |       |
| 17                     | 75 | 75 | 50 | 50  | 25 | 50 |       |
| 18                     | 75 | 75 | 50 | 50  | 25 | 25 |       |
| 19                     | 50 | 50 | 50 | 50  | 25 | 50 |       |
| 20                     | 75 | 75 | 50 | 25  | 25 | 25 |       |
| 21                     | 75 | 75 | 50 | 25  | 50 | 25 |       |
| 22                     | 75 | 75 | 50 | 50  | 50 | 50 |       |
| 23                     | 50 | 75 | 50 | 50  | 25 | 25 |       |
| 24                     | 75 | 75 | 50 | 25  | 25 | 25 |       |
| 25                     | 75 | 75 | 50 | 25  | 50 | 25 |       |
| <b>Average score</b>   | 64 | 67 | 50 | 41  | 33 | 38 | 293   |
| <b>Overall average</b> |    |    |    |     |    |    | 48.83 |

**Table: E.3: Household social  
Saliyawewa**

| Household No.          | Q1  | Q2  | Q3  | Q4  |       |
|------------------------|-----|-----|-----|-----|-------|
| 1                      | 75  | 50  | 75  | 50  |       |
| 2                      | 50  | 50  | 75  | 50  |       |
| 3                      | 75  | 75  | 100 | 25  |       |
| 4                      | 25  | 50  | 75  | 50  |       |
| 5                      | 50  | 50  | 50  | 25  |       |
| 6                      | 75  | 50  | 50  | 50  |       |
| 7                      | 75  | 25  | 25  | 50  |       |
| 8                      | 100 | 50  | 75  | 100 |       |
| 9                      | 75  | 25  | 75  | 50  |       |
| 10                     | 25  | 50  | 75  | 50  |       |
| 11                     | 75  | 50  | 75  | 50  |       |
| 12                     | 25  | 50  | 75  | 50  |       |
| 13                     | 75  | 100 | 50  | 50  |       |
| 14                     | 75  | 75  | 75  | 50  |       |
| 15                     | 50  | 50  | 100 | 50  |       |
| 16                     | 75  | 75  | 75  | 75  |       |
| 17                     | 50  | 50  | 100 | 50  |       |
| 18                     | 75  | 50  | 75  | 75  |       |
| 19                     | 75  | 75  | 75  | 50  |       |
| 20                     | 75  | 50  | 75  | 75  |       |
| 21                     | 50  | 75  | 50  | 50  |       |
| 22                     | 75  | 50  | 75  | 50  |       |
| 23                     | 50  | 75  | 75  | 50  |       |
| 24                     | 75  | 75  | 75  | 75  |       |
| 25                     | 50  | 75  | 50  | 75  |       |
| <b>Average score</b>   | 63  | 58  | 71  | 55  | 247   |
| <b>Overall average</b> |     |     |     |     | 61.75 |



**Table E.4: Household financial  
Saliyawewa**

| Household No.          | Q1  | Q2  | Q3  | Q4  | Q5  | Q6  |     |
|------------------------|-----|-----|-----|-----|-----|-----|-----|
| 1                      | 25  | 50  | 100 | 100 | 100 | 25  |     |
| 2                      | 25  | 50  | 100 | 100 | 100 | 25  |     |
| 3                      | 50  | 75  | 75  | 75  | 100 | 25  |     |
| 4                      | 25  | 25  | 100 | 100 | 100 | 50  |     |
| 5                      | 50  | 50  | 75  | 100 | 75  | 25  |     |
| 6                      | 25  | 100 | 100 | 75  | 100 | 50  |     |
| 7                      | 100 | 50  | 100 | 100 | 75  | 25  |     |
| 8                      | 50  | 50  | 100 | 100 | 100 | 25  |     |
| 9                      | 25  | 25  | 50  | 100 | 100 | 25  |     |
| 10                     | 25  | 50  | 100 | 50  | 100 | 25  |     |
| 11                     | 75  | 50  | 100 | 100 | 75  | 50  |     |
| 12                     | 25  | 50  | 100 | 75  | 100 | 25  |     |
| 13                     | 100 | 25  | 75  | 100 | 100 | 75  |     |
| 14                     | 25  | 25  | 100 | 100 | 50  | 25  |     |
| 15                     | 50  | 50  | 75  | 100 | 100 | 25  |     |
| 16                     | 25  | 25  | 100 | 75  | 100 | 25  |     |
| 17                     | 50  | 50  | 100 | 100 | 50  | 100 |     |
| 18                     | 25  | 25  | 50  | 100 | 100 | 75  |     |
| 19                     | 50  | 50  | 100 | 100 | 25  | 25  |     |
| 20                     | 25  | 75  | 100 | 100 | 100 | 50  |     |
| 21                     | 75  | 50  | 100 | 100 | 75  | 25  |     |
| 22                     | 25  | 75  | 75  | 100 | 100 | 25  |     |
| 23                     | 25  | 50  | 100 | 75  | 100 | 50  |     |
| 24                     | 25  | 50  | 75  | 100 | 75  | 25  |     |
| 25                     | 100 | 75  | 100 | 100 | 100 | 25  |     |
| <b>Average score</b>   | 44  | 50  | 90  | 93  | 88  | 37  | 402 |
| <b>Overall average</b> |     |     |     |     |     |     | 67  |

**Table E.5: Household Environmental  
Saliyawewa**

| Household No.          | Q1  | Q2  | Q3  |       |
|------------------------|-----|-----|-----|-------|
| 1                      | 75  | 100 | 75  |       |
| 2                      | 75  | 75  | 25  |       |
| 3                      | 75  | 75  | 75  |       |
| 4                      | 50  | 100 | 75  |       |
| 5                      | 75  | 75  | 75  |       |
| 6                      | 50  | 75  | 100 |       |
| 7                      | 75  | 50  | 75  |       |
| 8                      | 75  | 75  | 100 |       |
| 9                      | 75  | 75  | 75  |       |
| 10                     | 100 | 25  | 75  |       |
| 11                     | 75  | 75  | 75  |       |
| 12                     | 25  | 75  | 100 |       |
| 13                     | 75  | 100 | 75  |       |
| 14                     | 50  | 75  | 75  |       |
| 15                     | 75  | 75  | 75  |       |
| 16                     | 75  | 75  | 100 |       |
| 17                     | 75  | 75  | 75  |       |
| 18                     | 25  | 100 | 75  |       |
| 19                     | 75  | 75  | 50  |       |
| 20                     | 75  | 75  | 75  |       |
| 21                     | 75  | 100 | 75  |       |
| 22                     | 50  | 75  | 75  |       |
| 23                     | 75  | 75  | 50  |       |
| 24                     | 75  | 100 | 75  |       |
| 25                     | 100 | 100 | 100 |       |
| <b>Average score</b>   | 69  | 79  | 76  | 224   |
| <b>Overall average</b> |     |     |     | 74.67 |

**Table E.6: O&M  
Authority survey  
Sustainability dimensions  
Saliyawewa**

**Technical**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q2               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3               | 75       | 100       | 75   | 25   | 75   | 100       | 75        |
| Q4               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q5               | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| Q6               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| <b>Total</b>     |          |           |      |      |      |           | 475.00    |
| <b>Ave.score</b> |          |           |      |      |      |           | 79        |

**Institutional**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q2               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3               | 75       | 100       | 75   | 25   | 75   | 100       | 75        |
| Q4               | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q5               | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| Q6               | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| Q7               | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q8               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| <b>Total</b>     |          |           |      |      |      |           | 500       |
| <b>Ave.score</b> |          |           |      |      |      |           | 62.50     |

**Social**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| Q2               | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q3               | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| <b>Total</b>     |          |           |      |      |      |           | 25        |
| <b>Ave.score</b> |          |           |      |      |      |           | 8.33      |

**Financial**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q2               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q3               | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| <b>Total</b>     |          |           |      |      |      |           | 200       |
| <b>Ave.score</b> |          |           |      |      |      |           | 66.67     |

**Environmental**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q2               | 75       | 50        | 50   | 75   | 25   | 25        | 50        |
| Q3               | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| <b>Total</b>     |          |           |      |      |      |           | 225       |
| <b>Ave.score</b> |          |           |      |      |      |           | 75        |

**Table E.7: O&M Authority survey-Saliyawewa  
Project Implementation**

| Question No.      | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Care taker | Ave.score |
|-------------------|----------|-----------|------|------|------|------------|-----------|
| Q1                | 100      | 100       | 100  | 100  | 100  | 100        | 100       |
| Q2                | 50       | 75        | 50   | 25   | 25   | 75         | 50        |
| Q3                | 25       | 25        | 50   | 50   | 75   | 75         | 50        |
| Q4                | 75       | 100       | 75   | 25   | 75   | 100        | 75        |
| Q5                | 75       | 25        | 75   | 75   | 100  | 100        | 75        |
| Q6                | 100      | 100       | 100  | 100  | 100  | 100        | 100       |
| Q7                | 75       | 100       | 75   | 25   | 75   | 100        | 75        |
| Q8                | 50       | 75        | 50   | 25   | 25   | 75         | 50        |
| <b>Total</b>      |          |           |      |      |      |            | 575       |
| <b>Ave. Marks</b> |          |           |      |      |      |            | 71.88     |

**Table E.8: O&M Authority survey-Saliyawewa  
Institutional arrangement**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Care taker | Ave.score |
|------------------|----------|-----------|------|------|------|------------|-----------|
| Q1               | 0        | 0         | 0    | 0    | 0    | 0          | 0         |
| Q2               | 75       | 25        | 75   | 75   | 100  | 100        | 75        |
| Q3               | 25       | 25        | 25   | 25   | 25   | 25         | 25        |
| Q4               | 75       | 100       | 75   | 25   | 75   | 100        | 75        |
| <b>Total</b>     |          |           |      |      |      |            | 175       |
| <b>Ave.score</b> |          |           |      |      |      |            | 43.75     |

**Table E.9: O&M Authority survey-Saliyawewa  
Backup support system**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Care taker | Ave.score |
|------------------|----------|-----------|------|------|------|------------|-----------|
| Q1               | 50       | 75        | 50   | 25   | 25   | 75         | 50        |
| Q2               | 75       | 75        | 100  | 75   | 25   | 100        | 75        |
| Q3               | 75       | 25        | 75   | 75   | 100  | 100        | 75        |
| Q4               | 25       | 25        | 25   | 25   | 25   | 25         | 25        |
| Q5               | 0        | 0         | 0    | 0    | 0    | 0          | 0         |
| <b>Total</b>     |          |           |      |      |      |            | 225       |
| <b>Ave.score</b> |          |           |      |      |      |            | 45        |

**Table E.10: NGO survey-Saliyawewa  
Project Implementation**

| Question No.      | PO  | CF  | TO  | Ave.score |
|-------------------|-----|-----|-----|-----------|
| Q1                | 75  | 25  | 50  | 50        |
| Q2                | 25  | 75  | 50  | 50        |
| Q3                | 75  | 75  | 75  | 75        |
| Q4                | 25  | 25  | 25  | 25        |
| Q5                | 100 | 75  | 50  | 75        |
| Q6                | 100 | 100 | 25  | 75        |
| Q7                | 25  | 100 | 100 | 75        |
| Q8                | 75  | 100 | 50  | 75        |
| <b>Total</b>      |     |     |     | 500       |
| <b>Ave. score</b> |     |     |     | 62.50     |

**Table E.11: Local authority survey-Saliyawewa  
Project Implementation**

| Question No.     | Chairman | Secretary | TO | Ave.score |
|------------------|----------|-----------|----|-----------|
| Q1               | 50       | 75        | 25 | 50        |
| Q2               | 25       | 25        | 25 | 25        |
| Q3               | 100      | 75        | 50 | 75        |
| Q4               | 25       | 25        | 25 | 25        |
| Q5               | 50       | 100       | 75 | 75        |
| Q6               | 100      | 75        | 50 | 75        |
| Q7               | 25       | 25        | 25 | 25        |
| Q8               | 75       | 100       | 50 | 75        |
| <b>Total</b>     |          |           |    | 425       |
| <b>Ave.score</b> |          |           |    | 53.13     |

**Table E.12: Local authority survey-Saliyawewa  
Institutional arrangement**

| Question No.     | Chairman | Secretary | TO | Ave.score |
|------------------|----------|-----------|----|-----------|
| Q1               | 0        | 0         | 0  | 0         |
| Q2               | 100      | 75        | 50 | 75        |
| Q3               | 25       | 50        | 75 | 50        |
| Q4               | 75       | 100       | 50 | 75        |
| <b>Total</b>     |          |           |    | 200       |
| <b>Ave.score</b> |          |           |    | 50        |

**Table E.13: Local authority survey-Saliyawewa  
Backup support system**

| Question No.     | Chairman | Secretary | TO | Ave.score |
|------------------|----------|-----------|----|-----------|
| Q1               | 25       | 50        | 75 | 50        |
| Q2               | 0        | 0         | 0  | 0         |
| Q3               | 25       | 25        | 25 | 25        |
| Q4               | 25       | 25        | 25 | 25        |
| Q5               | 0        | 0         | 0  | 0         |
| <b>Total</b>     |          |           |    | 100       |
| <b>Ave.score</b> |          |           |    | 20        |

**Table E.14: PIU survey-Saliyawewa  
Project Implementation**

| Question No.      | DM  | Engineer | Sociologist | Ave. score   |
|-------------------|-----|----------|-------------|--------------|
| Q1                | 100 | 75       | 50          | 75           |
| Q2                | 50  | 75       | 100         | 75           |
| Q3                | 75  | 100      | 50          | 75           |
| Q4                | 25  | 50       | 75          | 50           |
| Q5                | 100 | 100      | 100         | 100          |
| Q6                | 100 | 100      | 100         | 100          |
| Q7                | 75  | 100      | 50          | 75           |
| Q8                | 100 | 75       | 50          | 75           |
| <b>Total</b>      |     |          |             | <b>625</b>   |
| <b>Ave. score</b> |     |          |             | <b>78.13</b> |

**Table E.15: PMU survey-Saliyawewa  
Project Implementation**

| Question No.      | Ch. Eng. | Engineer | Sociologist | Ave.score    |
|-------------------|----------|----------|-------------|--------------|
| Q1                | 75       | 50       | 100         | 75           |
| Q2                | 50       | 100      | 75          | 75           |
| Q3                | 100      | 100      | 25          | 75           |
| Q4                | 25       | 50       | 75          | 50           |
| Q5                | 100      | 100      | 100         | 100          |
| Q6                | 100      | 100      | 100         | 100          |
| Q7                | 100      | 100      | 100         | 100          |
| Q8                | 50       | 75       | 100         | 75           |
| <b>Total</b>      |          |          |             | <b>650</b>   |
| <b>Ave. score</b> |          |          |             | <b>81.25</b> |

**Table E.16: NWSDB survey-Saliyawewa  
Institutional arrangement**

| Question No.      | RM  | Engineer | Sociologist | Ave.score    |
|-------------------|-----|----------|-------------|--------------|
| Q1                | 0   | 0        | 0           | 0            |
| Q2                | 100 | 100      | 25          | 75           |
| Q3                | 25  | 25       | 25          | 25           |
| Q4                | 50  | 100      | 75          | 75           |
| <b>Total</b>      |     |          |             | <b>175</b>   |
| <b>Ave. marks</b> |     |          |             | <b>43.75</b> |

**Table E.17: NWSDB survey-Saliyawewa  
Backup support system**

| Question No.     | RM  | Engineer | Sociologist | Ave.score    |
|------------------|-----|----------|-------------|--------------|
| Q1               | 100 | 100      | 25          | 75           |
| Q2               | 75  | 25       | 50          | 50           |
| Q3               | 75  | 50       | 100         | 75           |
| Q4               | 25  | 25       | 25          | 25           |
| Q5               | 0   | 0        | 0           | 0            |
|                  |     |          |             | <b>225</b>   |
| <b>Ave.score</b> |     |          |             | <b>56.25</b> |

**District -Puttalam**  
**Small Town - Kirimetiya**  
**Household survey**  
**Sustainability dimensions**

**Table E.18:Household Technical**  
**Kirimetiya**

| Household No.          | Q1  | Q2   | Q3  | Q4  | Q5 | Q6   |       |
|------------------------|-----|------|-----|-----|----|------|-------|
| 1                      | 75  | 100  | 100 | 75  | 75 | 75   |       |
| 2                      | 75  | 75   | 100 | 75  | 50 | 50   |       |
| 3                      | 100 | 100  | 100 | 75  | 75 | 75   |       |
| 4                      | 75  | 100  | 100 | 75  | 75 | 75   |       |
| 5                      | 75  | 50   | 100 | 100 | 50 | 100  |       |
| 6                      | 75  | 100  | 100 | 75  | 75 | 75   |       |
| 7                      | 50  | 100  | 100 | 75  | 75 | 75   |       |
| 8                      | 75  | 100  | 100 | 50  | 75 | 100  |       |
| 9                      | 75  | 75   | 100 | 50  | 50 | 10   |       |
| 10                     | 100 | 100  | 100 | 75  | 50 | 75   |       |
| 11                     | 75  | 100  | 100 | 50  | 50 | 75   |       |
| 12                     | 75  | 75   | 100 | 75  | 75 | 75   |       |
| 13                     | 100 | 100  | 100 | 50  | 75 | 100  |       |
| 14                     | 50  | 100  | 100 | 75  | 75 | 75   |       |
| 15                     | 75  | 100  | 100 | 50  | 75 | 75   |       |
| 16                     | 50  | 100  | 100 | 75  | 50 | 75   |       |
| 17                     | 50  | 100  | 100 | 50  | 75 | 75   |       |
| 18                     | 75  | 100  | 100 | 75  | 50 | 50   |       |
| 19                     | 75  | 75   | 100 | 50  | 75 | 75   |       |
| 20                     | 100 | 100  | 100 | 75  | 50 | 50   |       |
| 21                     | 75  | 100  | 100 | 50  | 50 | 75   |       |
| 22                     | 75  | 100  | 100 | 50  | 50 | 100  |       |
| 23                     | 75  | 75   | 100 | 50  | 25 | 75   |       |
| 24                     | 50  | 100  | 100 | 75  | 25 | 75   |       |
| 25                     | 75  | 100  | 100 | 75  | 75 | 75   |       |
| <b>Average score</b>   | 74  | 91.2 | 100 | 66  | 61 | 73.4 | 465.6 |
| <b>Overall average</b> |     |      |     |     |    |      | 77.60 |

**Table E.19: Husehold Institutional  
Kirimetiya**

| Household No.          | Q1  | Q2  | Q3  | Q4  | Q5  | Q6  |       |
|------------------------|-----|-----|-----|-----|-----|-----|-------|
| 1                      | 75  | 75  | 100 | 75  | 75  | 75  |       |
| 2                      | 75  | 50  | 75  | 100 | 100 | 50  |       |
| 3                      | 75  | 75  | 100 | 75  | 75  | 75  |       |
| 4                      | 50  | 75  | 75  | 75  | 50  | 75  |       |
| 5                      | 75  | 100 | 75  | 100 | 75  | 50  |       |
| 6                      | 50  | 75  | 100 | 75  | 75  | 50  |       |
| 7                      | 75  | 75  | 100 | 75  | 50  | 75  |       |
| 8                      | 75  | 75  | 75  | 75  | 75  | 75  |       |
| 9                      | 50  | 100 | 100 | 75  | 75  | 50  |       |
| 10                     | 75  | 75  | 100 | 50  | 50  | 75  |       |
| 11                     | 100 | 75  | 100 | 75  | 75  | 50  |       |
| 12                     | 100 | 75  | 50  | 75  | 75  | 75  |       |
| 13                     | 75  | 75  | 100 | 75  | 50  | 75  |       |
| 14                     | 50  | 75  | 75  | 100 | 50  | 25  |       |
| 15                     | 75  | 75  | 75  | 75  | 75  | 75  |       |
| 16                     | 75  | 75  | 100 | 75  | 25  | 75  |       |
| 17                     | 50  | 75  | 100 | 100 | 75  | 75  |       |
| 18                     | 75  | 100 | 75  | 75  | 75  | 100 |       |
| 19                     | 75  | 75  | 100 | 75  | 25  | 75  |       |
| 20                     | 75  | 75  | 100 | 25  | 75  | 75  |       |
| 21                     | 75  | 75  | 100 | 75  | 75  | 25  |       |
| 22                     | 75  | 75  | 100 | 75  | 50  | 75  |       |
| 23                     | 75  | 75  | 50  | 100 | 75  | 50  |       |
| 24                     | 100 | 25  | 100 | 75  | 75  | 75  |       |
| 25                     | 75  | 75  | 100 | 75  | 75  | 75  |       |
| <b>Average score</b>   | 73  | 75  | 89  | 77  | 66  | 66  | 446   |
| <b>Overall average</b> |     |     |     |     |     |     | 74.33 |



**Table E.20: Household Social  
Kirimetiya**

| Household No.          | Q1  | Q2  | Q3  | Q4 |       |
|------------------------|-----|-----|-----|----|-------|
| 1                      | 75  | 75  | 75  | 50 |       |
| 2                      | 75  | 75  | 75  | 25 |       |
| 3                      | 100 | 50  | 50  | 25 |       |
| 4                      | 50  | 75  | 75  | 50 |       |
| 5                      | 100 | 75  | 50  | 25 |       |
| 6                      | 100 | 100 | 50  | 50 |       |
| 7                      | 75  | 75  | 25  | 50 |       |
| 8                      | 50  | 75  | 75  | 75 |       |
| 9                      | 75  | 25  | 75  | 50 |       |
| 10                     | 100 | 75  | 100 | 50 |       |
| 11                     | 75  | 75  | 75  | 50 |       |
| 12                     | 50  | 100 | 75  | 25 |       |
| 13                     | 75  | 75  | 50  | 50 |       |
| 14                     | 25  | 75  | 100 | 50 |       |
| 15                     | 50  | 75  | 100 | 50 |       |
| 16                     | 100 | 75  | 75  | 25 |       |
| 17                     | 75  | 75  | 100 | 50 |       |
| 18                     | 50  | 25  | 75  | 75 |       |
| 19                     | 100 | 75  | 75  | 50 |       |
| 20                     | 100 | 75  | 75  | 25 |       |
| 21                     | 50  | 25  | 75  | 50 |       |
| 22                     | 100 | 75  | 75  | 25 |       |
| 23                     | 75  | 75  | 75  | 25 |       |
| 24                     | 50  | 75  | 75  | 25 |       |
| 25                     | 50  | 75  | 50  | 25 |       |
| <b>Average score</b>   | 73  | 70  | 72  | 42 | 257   |
| <b>Overall average</b> |     |     |     |    | 64.25 |

**Table E.21: Husehold Financial  
Kirimetiya**

| Household No.          | Q1  | Q2  | Q3  | Q4  | Q5  | Q6  |      |
|------------------------|-----|-----|-----|-----|-----|-----|------|
| 1                      | 25  | 50  | 100 | 100 | 100 | 25  |      |
| 2                      | 25  | 50  | 100 | 75  | 100 | 50  |      |
| 3                      | 50  | 50  | 75  | 75  | 75  | 25  |      |
| 4                      | 25  | 25  | 100 | 100 | 100 | 50  |      |
| 5                      | 50  | 50  | 75  | 100 | 75  | 25  |      |
| 6                      | 25  | 75  | 75  | 75  | 100 | 50  |      |
| 7                      | 100 | 50  | 75  | 75  | 100 | 25  |      |
| 8                      | 25  | 50  | 100 | 100 | 100 | 50  |      |
| 9                      | 25  | 25  | 50  | 100 | 100 | 25  |      |
| 10                     | 25  | 50  | 100 | 50  | 100 | 25  |      |
| 11                     | 75  | 50  | 100 | 100 | 100 | 50  |      |
| 12                     | 25  | 50  | 100 | 75  | 100 | 25  |      |
| 13                     | 50  | 25  | 75  | 75  | 100 | 75  |      |
| 14                     | 25  | 100 | 50  | 100 | 50  | 25  |      |
| 15                     | 50  | 50  | 75  | 100 | 100 | 25  |      |
| 16                     | 25  | 25  | 100 | 75  | 100 | 25  |      |
| 17                     | 50  | 50  | 100 | 100 | 50  | 100 |      |
| 18                     | 25  | 25  | 50  | 50  | 100 | 75  |      |
| 19                     | 50  | 50  | 75  | 100 | 25  | 25  |      |
| 20                     | 25  | 50  | 100 | 100 | 100 | 50  |      |
| 21                     | 75  | 50  | 100 | 50  | 75  | 50  |      |
| 22                     | 25  | 75  | 100 | 100 | 100 | 25  |      |
| 23                     | 25  | 50  | 100 | 75  | 100 | 50  |      |
| 24                     | 25  | 50  | 100 | 100 | 75  | 25  |      |
| 25                     | 100 | 75  | 100 | 100 | 100 | 25  |      |
| <b>Average score</b>   | 41  | 50  | 87  | 86  | 89  | 40  | 393  |
| <b>Overall average</b> |     |     |     |     |     |     | 65.5 |

**Table E.22: Husehold Environmental  
Kirimetiya**

| Household No.          | Q1  | Q2  | Q3 |       |
|------------------------|-----|-----|----|-------|
| 1                      | 75  | 100 | 75 |       |
| 2                      | 75  | 75  | 25 |       |
| 3                      | 50  | 75  | 75 |       |
| 4                      | 50  | 100 | 75 |       |
| 5                      | 75  | 50  | 75 |       |
| 6                      | 50  | 75  | 75 |       |
| 7                      | 75  | 50  | 75 |       |
| 8                      | 75  | 75  | 50 |       |
| 9                      | 75  | 50  | 75 |       |
| 10                     | 50  | 25  | 75 |       |
| 11                     | 75  | 75  | 75 |       |
| 12                     | 25  | 75  | 75 |       |
| 13                     | 75  | 50  | 75 |       |
| 14                     | 50  | 75  | 75 |       |
| 15                     | 75  | 75  | 75 |       |
| 16                     | 75  | 75  | 75 |       |
| 17                     | 100 | 50  | 75 |       |
| 18                     | 25  | 50  | 75 |       |
| 19                     | 100 | 75  | 50 |       |
| 20                     | 75  | 75  | 75 |       |
| 21                     | 75  | 50  | 75 |       |
| 22                     | 50  | 75  | 75 |       |
| 23                     | 75  | 75  | 50 |       |
| 24                     | 75  | 100 | 75 |       |
| 25                     | 100 | 100 | 50 |       |
| <b>Average score</b>   | 68  | 70  | 69 | 207   |
| <b>Overall average</b> |     |     |    | 69.00 |

**Table E.23: O&M authority survey- Kiritmetiyana  
Sustainability dimensions**

**Technical**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q2               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q4               | 75       | 25        | 25   | 75   | 50   | 50        | 50        |
| Q5               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q6               | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| <b>Total</b>     |          |           |      |      |      |           | 350       |
| <b>Ave.score</b> |          |           |      |      |      |           | 58.33     |

**Institutional**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q2               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3               | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q4               | 75       | 25        | 25   | 75   | 50   | 50        | 50        |
| Q5               | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| Q6               | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| Q7               | 25       | 75        | 75   | 75   | 100  | 100       | 75        |
| Q8               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| <b>Total</b>     |          |           |      |      |      |           | 425       |
| <b>Ave.score</b> |          |           |      |      |      |           | 53.13     |

**Social**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q2               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q3               | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| <b>Total</b>     |          |           |      |      |      |           | 75        |
| <b>Ave.score</b> |          |           |      |      |      |           | 75        |

**Financial**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q2               | 75       | 25        | 25   | 75   | 50   | 50        | 50        |
| Q3               | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| <b>Total</b>     |          |           |      |      |      |           | 100       |
| <b>Ave.score</b> |          |           |      |      |      |           | 33.33     |

**Environmental**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q2               | 25       | 75        | 75   | 75   | 100  | 100       | 75        |
| Q3               | 75       | 25        | 25   | 75   | 50   | 50        | 50        |
| <b>Total</b>     |          |           |      |      |      |           | 175       |
| <b>Ave.score</b> |          |           |      |      |      |           | 58.33     |

**Table E.24: O&M authority survey Kirimetiya -  
Project Implementation**

| Question No.      | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|-------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1                | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q2                | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q3                | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| Q4                | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q5                | 25       | 100       | 100  | 75   | 75   | 75        | 75        |
| Q6                | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q7                | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| Q8                | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| <b>Total</b>      |          |           |      |      |      |           | 550       |
| <b>Ave. score</b> |          |           |      |      |      |           | 68.75     |

**Table E.25: O&M authority survey-Kirimetiya  
Institutional arrangement**

| Question No.      | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|-------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1                | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q2                | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q3                | 25       | 100       | 100  | 75   | 75   | 75        | 75        |
| Q4                | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| <b>Total</b>      |          |           |      |      |      |           | 225       |
| <b>Ave. scoer</b> |          |           |      |      |      |           | 56.25     |

**Table E.26: O&M authority survey- Kirimetiya  
Backup support system**

| Question No.      | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|-------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1                | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q2                | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q3                | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q4                | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q5                | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| <b>Total</b>      |          |           |      |      |      |           | 125       |
| <b>Ave. score</b> |          |           |      |      |      |           | 25        |

**Table E.27: NGO survey- Kirimetiyan**  
**Project implementation**

| Question No.      | PO  | CF  | TO  | Ave.score    |
|-------------------|-----|-----|-----|--------------|
| Q1                | 50  | 75  | 100 | 75           |
| Q2                | 100 | 100 | 100 | 100          |
| Q3                | 100 | 50  | 75  | 75           |
| Q4                | 100 | 25  | 25  | 50           |
| Q5                | 100 | 50  | 75  | 75           |
| Q6                | 50  | 75  | 100 | 75           |
| Q7                | 50  | 75  | 100 | 75           |
| Q8                | 25  | 25  | 25  | 25           |
| <b>Total</b>      |     |     |     | <b>550</b>   |
| <b>Ave. score</b> |     |     |     | <b>68.75</b> |

**Table E.28: Local authority survey- Kirimetiyan**  
**Project implementation**

| Question No.      | Chairman | Secretary | TO  | Ave.score    |
|-------------------|----------|-----------|-----|--------------|
| Q1                | 50       | 75        | 100 | 75           |
| Q2                | 100      | 100       | 100 | 100          |
| Q3                | 75       | 50        | 100 | 75           |
| Q4                | 50       | 75        | 25  | 50           |
| Q5                | 75       | 100       | 50  | 75           |
| Q6                | 100      | 50        | 75  | 75           |
| Q7                | 25       | 25        | 25  | 25           |
| Q8                | 50       | 75        | 100 | 75           |
| <b>Total</b>      |          |           |     | <b>550</b>   |
| <b>Ave. score</b> |          |           |     | <b>68.75</b> |

**Table E.29: Local authority survey- Kirimetiyan**  
**Institutional arrangement**

| Question No.      | Chairman | Secretary | TO  | Ave.score    |
|-------------------|----------|-----------|-----|--------------|
| Q1                | 25       | 25        | 25  | 25           |
| Q2                | 50       | 75        | 25  | 50           |
| Q3                | 75       | 50        | 100 | 75           |
| Q4                | 100      | 50        | 75  | 75           |
| <b>Total</b>      |          |           |     | <b>225</b>   |
| <b>Ave. score</b> |          |           |     | <b>56.25</b> |

**Table E.30: Local authority survey- Kirimetiyan**  
**Backup support system**

| Question No.      | Chairman | Secretary | TO | Ave.score |
|-------------------|----------|-----------|----|-----------|
| Q1                | 75       | 25        | 50 | 50        |
| Q2                | 0        | 0         | 0  | 0         |
| Q3                | 0        | 0         | 0  | 0         |
| Q4                | 25       | 25        | 25 | 25        |
| Q5                | 0        | 0         | 0  | 0         |
| <b>Total</b>      |          |           |    | <b>75</b> |
| <b>Ave. score</b> |          |           |    | <b>15</b> |

**Table E.31: PIU survey- Kirimetiya  
Project implementation**

| Question No.     | DM  | Engineer | Sociologist | Ave.score    |
|------------------|-----|----------|-------------|--------------|
| Q1               | 50  | 50       | 50          | 50           |
| Q2               | 75  | 25       | 50          | 50           |
| Q3               | 100 | 25       | 100         | 75           |
| Q4               | 100 | 75       | 50          | 75           |
| Q5               | 100 | 100      | 100         | 100          |
| Q6               | 100 | 100      | 100         | 100          |
| Q7               | 75  | 50       | 100         | 75           |
| Q8               | 75  | 75       | 75          | 75           |
| <b>Total</b>     |     |          |             | <b>600</b>   |
| <b>Ave.score</b> |     |          |             | <b>75.00</b> |

**Table E.32: PMU- Kirimetiya  
Project implementation**

| Question No.     | Ch.Engineer | Engineer | Sociologist | Ave. score   |
|------------------|-------------|----------|-------------|--------------|
| Q1               | 75          | 100      | 50          | 75           |
| Q2               | 100         | 75       | 50          | 75           |
| Q3               | 100         | 75       | 50          | 75           |
| Q4               | 50          | 25       | 75          | 50           |
| Q5               | 100         | 100      | 100         | 100          |
| Q6               | 100         | 100      | 100         | 100          |
| Q7               | 100         | 100      | 100         | 100          |
| Q8               | 100         | 75       | 50          | 75           |
| <b>Total</b>     |             |          |             | <b>650</b>   |
| <b>Ave.score</b> |             |          |             | <b>81.25</b> |

**Table E.33: NWSDB survey- Kirimetiya  
Institutional arrangement**

| Question No.      | RM  | Engineer | Sociologist | Ave.score    |
|-------------------|-----|----------|-------------|--------------|
| Q1                | 25  | 25       | 25          | 25           |
| Q2                | 50  | 75       | 100         | 75           |
| Q3                | 25  | 50       | 75          | 50           |
| Q4                | 100 | 75       | 50          | 75           |
| <b>Total</b>      |     |          |             | <b>225</b>   |
| <b>Ave. score</b> |     |          |             | <b>56.25</b> |

**Table E.34: NWSDB survey- Kirimetiya  
Backup support system**

| Question No.      | RM  | Engineer | Sociologist | Ave.score    |
|-------------------|-----|----------|-------------|--------------|
| Q1                | 75  | 50       | 100         | 75           |
| Q2                | 100 | 25       | 100         | 75           |
| Q3                | 50  | 100      | 0           | 50           |
| Q4                | 25  | 50       | 0           | 25           |
| Q5                | 0   | 0        | 0           | 0            |
| <b>Total</b>      |     |          |             | <b>225</b>   |
| <b>Ave. score</b> |     |          |             | <b>56.25</b> |

**District- Kegalle**  
**Small town-Kitulgala**  
**Household survey**  
**Sustainability dimensions**

**Table E.35: Household Technical  
 Kitulgala**

| Household No.       | Q1  | Q2  | Q3  | Q4  | Q5  | Q6  |       |
|---------------------|-----|-----|-----|-----|-----|-----|-------|
| 1                   | 100 | 100 | 100 | 75  | 100 | 100 |       |
| 2                   | 100 | 100 | 100 | 100 | 100 | 100 |       |
| 3                   | 75  | 75  | 100 | 75  | 75  | 75  |       |
| 4                   | 100 | 100 | 100 | 75  | 100 | 75  |       |
| 5                   | 100 | 100 | 100 | 75  | 75  | 100 |       |
| 6                   | 100 | 100 | 100 | 50  | 100 | 75  |       |
| 7                   | 100 | 100 | 100 | 100 | 100 | 100 |       |
| 8                   | 100 | 75  | 100 | 75  | 100 | 100 |       |
| 9                   | 100 | 100 | 100 | 100 | 100 | 50  |       |
| 10                  | 75  | 100 | 100 | 75  | 75  | 100 |       |
| 11                  | 100 | 100 | 100 | 75  | 100 | 75  |       |
| 12                  | 100 | 100 | 100 | 100 | 100 | 100 |       |
| 13                  | 100 | 100 | 100 | 75  | 75  | 100 |       |
| 14                  | 100 | 75  | 100 | 75  | 100 | 100 |       |
| 15                  | 100 | 100 | 100 | 75  | 100 | 100 |       |
| 16                  | 100 | 100 | 100 | 75  | 75  | 100 |       |
| 17                  | 75  | 100 | 100 | 100 | 100 | 75  |       |
| 18                  | 100 | 100 | 100 | 75  | 100 | 100 |       |
| 19                  | 75  | 100 | 100 | 100 | 100 | 100 |       |
| 20                  | 100 | 75  | 100 | 100 | 100 | 75  |       |
| 21                  | 100 | 75  | 100 | 100 | 100 | 75  |       |
| 22                  | 100 | 100 | 100 | 100 | 100 | 100 |       |
| 23                  | 75  | 100 | 100 | 100 | 100 | 50  |       |
| 24                  | 100 | 100 | 100 | 100 | 100 | 100 |       |
| 25                  | 100 | 75  | 100 | 75  | 100 | 100 |       |
| <b>Ave.score</b>    | 95  | 94  | 100 | 85  | 95  | 89  | 558   |
| <b>Overall Ave.</b> |     |     |     |     |     |     | 93.00 |



**Table E.36: Household Institutional  
Kitulgala**

| Household No.       | Q1  | Q2  | Q3 | Q4 | Q5 | Q6 |       |
|---------------------|-----|-----|----|----|----|----|-------|
| 1                   | 75  | 75  | 25 | 50 | 75 | 75 |       |
| 2                   | 50  | 50  | 50 | 75 | 50 | 75 |       |
| 3                   | 50  | 75  | 25 | 50 | 50 | 75 |       |
| 4                   | 50  | 50  | 25 | 50 | 50 | 75 |       |
| 5                   | 50  | 75  | 50 | 50 | 50 | 50 |       |
| 6                   | 50  | 50  | 50 | 25 | 25 | 75 |       |
| 7                   | 100 | 75  | 25 | 50 | 50 | 50 |       |
| 8                   | 50  | 75  | 25 | 75 | 75 | 75 |       |
| 9                   | 100 | 50  | 25 | 50 | 50 | 50 |       |
| 10                  | 100 | 75  | 25 | 50 | 50 | 75 |       |
| 11                  | 100 | 75  | 50 | 75 | 50 | 75 |       |
| 12                  | 50  | 50  | 25 | 50 | 75 | 75 |       |
| 13                  | 100 | 75  | 25 | 50 | 75 | 75 |       |
| 14                  | 50  | 75  | 25 | 75 | 50 | 50 |       |
| 15                  | 100 | 50  | 50 | 50 | 25 | 75 |       |
| 16                  | 50  | 75  | 0  | 25 | 50 | 75 |       |
| 17                  | 75  | 50  | 75 | 50 | 50 | 75 |       |
| 18                  | 50  | 75  | 25 | 50 | 25 | 75 |       |
| 19                  | 75  | 75  | 50 | 75 | 75 | 50 |       |
| 20                  | 50  | 100 | 25 | 50 | 50 | 75 |       |
| 21                  | 50  | 75  | 75 | 50 | 75 | 75 |       |
| 22                  | 100 | 50  | 25 | 50 | 50 | 75 |       |
| 23                  | 50  | 75  | 25 | 50 | 50 | 50 |       |
| 24                  | 100 | 50  | 25 | 50 | 25 | 75 |       |
| 25                  | 50  | 75  | 25 | 50 | 50 | 75 |       |
| <b>Ave.score</b>    | 69  | 67  | 34 | 53 | 52 | 69 | 344   |
| <b>Overall Ave.</b> |     |     |    |    |    |    | 57.33 |

**Table E.37: Household Social  
Kitulgala**

| Household No.          | Q1  | Q2  | Q3  | Q4 |       |
|------------------------|-----|-----|-----|----|-------|
| 1                      | 100 | 75  | 100 | 25 |       |
| 2                      | 75  | 50  | 50  | 25 |       |
| 3                      | 75  | 75  | 100 | 75 |       |
| 4                      | 75  | 100 | 75  | 25 |       |
| 5                      | 100 | 100 | 75  | 50 |       |
| 6                      | 75  | 75  | 100 | 25 |       |
| 7                      | 75  | 75  | 75  | 25 |       |
| 8                      | 75  | 75  | 100 | 25 |       |
| 9                      | 75  | 75  | 75  | 75 |       |
| 10                     | 75  | 75  | 50  | 75 |       |
| 11                     | 50  | 25  | 75  | 25 |       |
| 12                     | 100 | 75  | 100 | 75 |       |
| 13                     | 75  | 100 | 75  | 25 |       |
| 14                     | 75  | 75  | 75  | 25 |       |
| 15                     | 25  | 25  | 100 | 25 |       |
| 16                     | 100 | 75  | 75  | 25 |       |
| 17                     | 75  | 75  | 75  | 25 |       |
| 18                     | 100 | 50  | 50  | 25 |       |
| 19                     | 75  | 50  | 50  | 25 |       |
| 20                     | 50  | 75  | 75  | 75 |       |
| 21                     | 50  | 50  | 25  | 25 |       |
| 22                     | 25  | 75  | 100 | 75 |       |
| 23                     | 75  | 100 | 100 | 25 |       |
| 24                     | 75  | 50  | 100 | 50 |       |
| 25                     | 100 | 50  | 75  | 25 |       |
| <b>Average score</b>   | 74  | 69  | 78  | 39 | 260   |
| <b>Overall average</b> |     |     |     |    | 65.00 |

**Table E.38: Household Financial  
Kitulgala**

| Household No.          | Q1  | Q2  | Q3  | Q4  | Q5  | Q6 |       |
|------------------------|-----|-----|-----|-----|-----|----|-------|
| 1                      | 100 | 75  | 75  | 100 | 75  | 50 |       |
| 2                      | 75  | 75  | 100 | 100 | 75  | 50 |       |
| 3                      | 100 | 100 | 75  | 75  | 50  | 25 |       |
| 4                      | 100 | 75  | 50  | 100 | 50  | 75 |       |
| 5                      | 100 | 75  | 75  | 75  | 50  | 50 |       |
| 6                      | 75  | 75  | 100 | 75  | 75  | 25 |       |
| 7                      | 100 | 50  | 75  | 100 | 75  | 50 |       |
| 8                      | 100 | 75  | 75  | 100 | 75  | 50 |       |
| 9                      | 100 | 75  | 75  | 50  | 75  | 50 |       |
| 10                     | 75  | 100 | 75  | 100 | 75  | 25 |       |
| 11                     | 100 | 50  | 75  | 100 | 75  | 50 |       |
| 12                     | 75  | 75  | 50  | 100 | 75  | 50 |       |
| 13                     | 75  | 75  | 75  | 50  | 50  | 25 |       |
| 14                     | 75  | 50  | 75  | 100 | 50  | 75 |       |
| 15                     | 100 | 75  | 75  | 100 | 50  | 50 |       |
| 16                     | 100 | 75  | 100 | 75  | 75  | 25 |       |
| 17                     | 75  | 50  | 75  | 100 | 75  | 75 |       |
| 18                     | 100 | 100 | 75  | 50  | 50  | 50 |       |
| 19                     | 100 | 75  | 75  | 75  | 75  | 50 |       |
| 20                     | 100 | 100 | 75  | 100 | 75  | 50 |       |
| 21                     | 100 | 75  | 75  | 75  | 100 | 50 |       |
| 22                     | 100 | 100 | 75  | 100 | 75  | 50 |       |
| 23                     | 75  | 50  | 75  | 75  | 75  | 50 |       |
| 24                     | 100 | 75  | 75  | 100 | 75  | 50 |       |
| 25                     | 50  | 75  | 75  | 75  | 75  | 50 |       |
| <b>Average score</b>   | 90  | 75  | 76  | 86  | 69  | 48 | 444   |
| <b>Overall average</b> |     |     |     |     |     |    | 74.00 |

**Table E.39: Household Environmental  
Kitulgala**

| Household No.          | Q1  | Q2  | Q3  |       |
|------------------------|-----|-----|-----|-------|
| 1                      | 50  | 100 | 100 |       |
| 2                      | 25  | 75  | 75  |       |
| 3                      | 100 | 50  | 100 |       |
| 4                      | 25  | 50  | 75  |       |
| 5                      | 100 | 50  | 75  |       |
| 6                      | 25  | 75  | 75  |       |
| 7                      | 25  | 50  | 100 |       |
| 8                      | 100 | 100 | 75  |       |
| 9                      | 100 | 100 | 100 |       |
| 10                     | 50  | 75  | 100 |       |
| 11                     | 75  | 100 | 50  |       |
| 12                     | 100 | 100 | 75  |       |
| 13                     | 100 | 75  | 100 |       |
| 14                     | 75  | 75  | 100 |       |
| 15                     | 50  | 75  | 100 |       |
| 16                     | 50  | 75  | 75  |       |
| 17                     | 50  | 25  | 100 |       |
| 18                     | 75  | 75  | 50  |       |
| 19                     | 75  | 75  | 75  |       |
| 20                     | 25  | 75  | 75  |       |
| 21                     | 100 | 100 | 75  |       |
| 22                     | 100 | 100 | 100 |       |
| 23                     | 50  | 50  | 75  |       |
| 24                     | 50  | 100 | 100 |       |
| 25                     | 100 | 50  | 50  |       |
| <b>Average score</b>   | 67  | 75  | 83  | 225   |
| <b>Overall average</b> |     |     |     | 75.00 |

**Table E.40: O&M authority survey- Kitulgala  
Sustainability dimensions**

**Technical**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| Q2               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q4               | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q5               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q6               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| <b>Total</b>     |          |           |      |      |      |           | 550       |
| <b>Ave.score</b> |          |           |      |      |      |           | 91.67     |

**Institutional**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q2               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3               | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q4               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q5               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q6               | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q7               | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q8               | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| <b>Total</b>     |          |           |      |      |      |           | 500       |
| <b>Ave.score</b> |          |           |      |      |      |           | 62.50     |

**Social**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q2               | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q3               | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| <b>Total</b>     |          |           |      |      |      |           | 125       |
| <b>Ave.score</b> |          |           |      |      |      |           | 41.67     |

**Financial**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q2               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3               | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| <b>Total</b>     |          |           |      |      |      |           | 150       |
| <b>Ave.score</b> |          |           |      |      |      |           | 50.00     |

**Environmental**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q2               | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q3               | 100      | 75        | 75   | 25   | 100  | 75        | 75        |
| <b>Total</b>     |          |           |      |      |      |           | 250       |
| <b>Ave.score</b> |          |           |      |      |      |           | 83.33     |

**Table E.41: O&M authority survey-Kitulgala  
Project Implementation**

| Question No. | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|--------------|----------|-----------|------|------|------|-----------|-----------|
| Q1           | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q2           | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3           | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q4           | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q5           | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q6           | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q7           | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q8           | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Total        |          |           |      |      |      |           | 575       |
| Ave.score    |          |           |      |      |      |           | 71.88     |

**Table E.42: O&M authority survey-Kitulgala  
Institutional arrangement**

| Question No. | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|--------------|----------|-----------|------|------|------|-----------|-----------|
| Q1           | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q2           | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q3           | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q4           | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Total        |          |           |      |      |      |           | 250       |
| Ave.score    |          |           |      |      |      |           | 62.50     |

**Table E.43: O&M authority survey-Kitulgala  
Backup support system**

| Question No. | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|--------------|----------|-----------|------|------|------|-----------|-----------|
| Q1           | 75       | 75        | 100  | 75   | 25   | 100       | 75        |
| Q2           | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3           | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q4           | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q5           | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| Total        |          |           |      |      |      |           | 275       |
| Ave.score    |          |           |      |      |      |           | 55.00     |

**Table E.44: NGO survey-Kitulgala  
Project implementation**

| Question No.     | PO  | CF  | TO  | Ave.score    |
|------------------|-----|-----|-----|--------------|
| Q1               | 75  | 25  | 50  | 50           |
| Q2               | 100 | 100 | 100 | 100          |
| Q3               | 50  | 75  | 100 | 75           |
| Q4               | 100 | 50  | 75  | 75           |
| Q5               | 75  | 100 | 50  | 75           |
| Q6               | 25  | 50  | 75  | 50           |
| Q7               | 75  | 100 | 50  | 75           |
| Q8               | 50  | 75  | 100 | 75           |
| <b>Total</b>     |     |     |     | <b>575</b>   |
| <b>Ave.score</b> |     |     |     | <b>71.88</b> |

**Table E.45: Local authority survey-Kitulgala  
Project implementation**

| Question No.     | Chairman | Secretary | TO  | Ave.score    |
|------------------|----------|-----------|-----|--------------|
| Q1               | 50       | 100       | 75  | 75           |
| Q2               | 100      | 75        | 50  | 75           |
| Q3               | 50       | 75        | 25  | 50           |
| Q4               | 50       | 75        | 25  | 50           |
| Q5               | 100      | 75        | 50  | 75           |
| Q6               | 50       | 100       | 75  | 75           |
| Q7               | 25       | 25        | 25  | 25           |
| Q8               | 50       | 75        | 100 | 75           |
| <b>Total</b>     |          |           |     | <b>500</b>   |
| <b>Ave.score</b> |          |           |     | <b>62.50</b> |

**Table E.46: Local authority survey-Kitulgala  
Institutional arrangement**

| Question No.     | Chairman | Secretary | TO  | Ave.score   |
|------------------|----------|-----------|-----|-------------|
| Q1               | 50       | 75        | 100 | 75          |
| Q2               | 100      | 75        | 50  | 75          |
| Q3               | 25       | 25        | 25  | 25          |
| Q4               | 50       | 75        | 100 | 75          |
| <b>Total</b>     |          |           |     | <b>250</b>  |
| <b>Ave.score</b> |          |           |     | <b>62.5</b> |

**Table E.47: Local authority survey-Kitulgala  
Backup support system**

| Question No.     | Chairman | Secretary | TO | Ave.score  |
|------------------|----------|-----------|----|------------|
| Q1               | 100      | 75        | 50 | 75         |
| Q2               | 25       | 25        | 25 | 25         |
| Q3               | 25       | 25        | 25 | 25         |
| Q4               | 25       | 25        | 25 | 25         |
| Q5               | 0        | 0         | 0  | 0          |
| <b>Total</b>     |          |           |    | <b>150</b> |
| <b>Ave.score</b> |          |           |    | <b>30</b>  |

**Table E.48: PIU survey-Kitulgala  
Project implementation**

| Question No.      | DM  | Engineer | Sociologist | Ave. Score   |
|-------------------|-----|----------|-------------|--------------|
| Q1                | 75  | 100      | 50          | 75           |
| Q2                | 100 | 75       | 50          | 75           |
| Q3                | 25  | 50       | 75          | 50           |
| Q4                | 50  | 25       | 75          | 50           |
| Q5                | 75  | 75       | 75          | 75           |
| Q6                | 100 | 100      | 100         | 100          |
| Q7                | 75  | 50       | 100         | 75           |
| Q8                | 75  | 75       | 75          | 75           |
| <b>Total</b>      |     |          |             | <b>575</b>   |
| <b>Ave. score</b> |     |          |             | <b>71.88</b> |

**Table E.49: PMU survey-Kitulgala  
Project implementation**

| Question No.      | Ch. Eng. | Engineer | Sociologist | Ave.score    |
|-------------------|----------|----------|-------------|--------------|
| Q1                | 75       | 50       | 100         | 75           |
| Q2                | 50       | 100      | 75          | 75           |
| Q3                | 100      | 100      | 25          | 75           |
| Q4                | 25       | 50       | 75          | 50           |
| Q5                | 100      | 100      | 100         | 100          |
| Q6                | 100      | 100      | 100         | 100          |
| Q7                | 100      | 100      | 100         | 100          |
| Q8                | 75       | 50       | 100         | 75           |
| <b>Total</b>      |          |          |             | <b>650</b>   |
| <b>Ave. Marks</b> |          |          |             | <b>81.25</b> |

**Table E.50: NWSDB survey-Kitulgala  
Institutional arrangement**

| Question No.      | RM  | Engineer | Sociologist | Ave.score    |
|-------------------|-----|----------|-------------|--------------|
| Q1                | 50  | 75       | 25          | 50           |
| Q2                | 50  | 100      | 75          | 75           |
| Q3                | 25  | 25       | 25          | 25           |
| Q4                | 100 | 50       | 75          | 75           |
| <b>Total</b>      |     |          |             | <b>225</b>   |
| <b>Ave. score</b> |     |          |             | <b>56.25</b> |

**Table E.51: NWSDB survey-Kitulgala  
Backup support system**

| Question No.     | RM  | Engineer | Sociologist | Ave.score   |
|------------------|-----|----------|-------------|-------------|
| Q1               | 75  | 75       | 75          | 75          |
| Q2               | 100 | 50       | 75          | 75          |
| Q3               | 50  | 75       | 25          | 50          |
| Q4               | 50  | 75       | 25          | 50          |
| Q5               | 0   | 0        | 0           | 0           |
| <b>Total</b>     |     |          |             | <b>250</b>  |
| <b>Ave.score</b> |     |          |             | <b>62.5</b> |



**District- Kegalle**  
**Small town-Dedigama**  
**Household survey**  
**Sustainability dimensions**

**Table E.52: Household Technical  
 Dedigama**

| Household No.          | Q1 | Q2  | Q3  | Q4 | Q5  | Q6  |       |
|------------------------|----|-----|-----|----|-----|-----|-------|
| 1                      | 25 | 100 | 100 | 50 | 100 | 100 |       |
| 2                      | 25 | 100 | 100 | 50 | 100 | 100 |       |
| 3                      | 50 | 75  | 100 | 50 | 75  | 75  |       |
| 4                      | 25 | 100 | 100 | 50 | 100 | 50  |       |
| 5                      | 50 | 100 | 100 | 75 | 50  | 100 |       |
| 6                      | 25 | 100 | 100 | 50 | 75  | 75  |       |
| 7                      | 50 | 100 | 100 | 75 | 100 | 100 |       |
| 8                      | 25 | 75  | 100 | 50 | 100 | 100 |       |
| 9                      | 25 | 100 | 100 | 50 | 100 | 50  |       |
| 10                     | 25 | 100 | 100 | 75 | 75  | 100 |       |
| 11                     | 50 | 100 | 100 | 50 | 100 | 75  |       |
| 12                     | 25 | 100 | 100 | 75 | 100 | 100 |       |
| 13                     | 25 | 100 | 100 | 75 | 75  | 100 |       |
| 14                     | 25 | 75  | 100 | 50 | 75  | 100 |       |
| 15                     | 25 | 100 | 100 | 75 | 100 | 100 |       |
| 16                     | 25 | 100 | 100 | 75 | 75  | 100 |       |
| 17                     | 25 | 100 | 100 | 50 | 100 | 75  |       |
| 18                     | 50 | 100 | 100 | 75 | 100 | 100 |       |
| 19                     | 25 | 100 | 100 | 50 | 100 | 100 |       |
| 20                     | 25 | 75  | 100 | 75 | 100 | 50  |       |
| 21                     | 25 | 75  | 100 | 75 | 100 | 50  |       |
| 22                     | 50 | 100 | 100 | 75 | 75  | 100 |       |
| 23                     | 25 | 100 | 100 | 50 | 100 | 25  |       |
| 24                     | 50 | 100 | 100 | 75 | 100 | 100 |       |
| 25                     | 25 | 75  | 100 | 50 | 75  | 100 |       |
| <b>Average scores</b>  | 32 | 94  | 100 | 62 | 90  | 85  | 463   |
| <b>Overall average</b> |    |     |     |    |     |     | 77.17 |

**Table E.53: Household Institutional  
Dedigama**

| Household No.          | Q1  | Q2  | Q3  | Q4  | Q5  | Q6  |       |
|------------------------|-----|-----|-----|-----|-----|-----|-------|
| 1                      | 100 | 75  | 75  | 75  | 75  | 75  |       |
| 2                      | 75  | 50  | 75  | 75  | 50  | 75  |       |
| 3                      | 100 | 75  | 75  | 75  | 50  | 75  |       |
| 4                      | 75  | 50  | 50  | 25  | 50  | 75  |       |
| 5                      | 100 | 75  | 75  | 75  | 50  | 50  |       |
| 6                      | 100 | 50  | 75  | 50  | 25  | 75  |       |
| 7                      | 100 | 75  | 50  | 75  | 50  | 50  |       |
| 8                      | 100 | 75  | 75  | 75  | 50  | 75  |       |
| 9                      | 75  | 50  | 75  | 50  | 50  | 50  |       |
| 10                     | 100 | 75  | 50  | 75  | 50  | 75  |       |
| 11                     | 100 | 75  | 75  | 75  | 50  | 75  |       |
| 12                     | 100 | 50  | 100 | 100 | 75  | 50  |       |
| 13                     | 75  | 75  | 75  | 100 | 50  | 75  |       |
| 14                     | 100 | 75  | 25  | 75  | 50  | 100 |       |
| 15                     | 100 | 50  | 75  | 75  | 25  | 75  |       |
| 16                     | 50  | 75  | 25  | 75  | 50  | 75  |       |
| 17                     | 100 | 50  | 75  | 75  | 50  | 75  |       |
| 18                     | 50  | 75  | 50  | 50  | 25  | 75  |       |
| 19                     | 100 | 75  | 75  | 75  | 50  | 50  |       |
| 20                     | 75  | 100 | 50  | 50  | 50  | 75  |       |
| 21                     | 100 | 75  | 75  | 75  | 75  | 50  |       |
| 22                     | 100 | 50  | 25  | 75  | 50  | 75  |       |
| 23                     | 75  | 75  | 75  | 50  | 50  | 50  |       |
| 24                     | 100 | 50  | 75  | 50  | 100 | 75  |       |
| 25                     | 100 | 75  | 75  | 75  | 50  | 75  |       |
| <b>Average score</b>   | 90  | 67  | 65  | 69  | 52  | 69  | 412   |
| <b>Overall average</b> |     |     |     |     |     |     | 68.67 |

**Table E.54: Household Social  
Dedigama**

| Household No.          | Q1  | Q2  | Q3  | Q4 |       |
|------------------------|-----|-----|-----|----|-------|
| 1                      | 100 | 75  | 75  | 25 |       |
| 2                      | 75  | 50  | 50  | 25 |       |
| 3                      | 100 | 75  | 75  | 50 |       |
| 4                      | 75  | 100 | 75  | 25 |       |
| 5                      | 100 | 75  | 75  | 50 |       |
| 6                      | 100 | 75  | 100 | 25 |       |
| 7                      | 100 | 75  | 75  | 25 |       |
| 8                      | 100 | 75  | 75  | 25 |       |
| 9                      | 75  | 75  | 75  | 50 |       |
| 10                     | 100 | 75  | 50  | 25 |       |
| 11                     | 50  | 75  | 75  | 25 |       |
| 12                     | 100 | 75  | 75  | 75 |       |
| 13                     | 100 | 75  | 75  | 25 |       |
| 14                     | 100 | 75  | 75  | 25 |       |
| 15                     | 25  | 25  | 75  | 25 |       |
| 16                     | 100 | 75  | 75  | 75 |       |
| 17                     | 100 | 75  | 75  | 25 |       |
| 18                     | 100 | 50  | 75  | 25 |       |
| 19                     | 75  | 75  | 50  | 25 |       |
| 20                     | 100 | 75  | 75  | 75 |       |
| 21                     | 50  | 75  | 25  | 25 |       |
| 22                     | 100 | 75  | 75  | 75 |       |
| 23                     | 75  | 100 | 100 | 25 |       |
| 24                     | 75  | 50  | 75  | 50 |       |
| 25                     | 100 | 50  | 75  | 25 |       |
| <b>Average score</b>   | 87  | 50  | 72  | 37 | 246   |
| <b>Overall average</b> |     |     |     |    | 61.50 |

**Table E.55: Household Financial  
Dedigama**

| Household No.          | Q1 | Q2  | Q3  | Q4  | Q5  | Q6 |       |
|------------------------|----|-----|-----|-----|-----|----|-------|
| 1                      | 25 | 75  | 75  | 100 | 75  | 50 |       |
| 2                      | 50 | 75  | 75  | 100 | 75  | 50 |       |
| 3                      | 25 | 100 | 75  | 75  | 50  | 25 |       |
| 4                      | 25 | 75  | 100 | 100 | 75  | 50 |       |
| 5                      | 25 | 75  | 75  | 100 | 75  | 50 |       |
| 6                      | 50 | 75  | 100 | 75  | 100 | 25 |       |
| 7                      | 25 | 50  | 75  | 100 | 75  | 50 |       |
| 8                      | 25 | 75  | 75  | 100 | 75  | 50 |       |
| 9                      | 25 | 75  | 50  | 50  | 100 | 50 |       |
| 10                     | 25 | 75  | 75  | 100 | 75  | 25 |       |
| 11                     | 25 | 50  | 75  | 100 | 75  | 50 |       |
| 12                     | 25 | 75  | 50  | 100 | 75  | 50 |       |
| 13                     | 50 | 75  | 75  | 25  | 75  | 25 |       |
| 14                     | 25 | 50  | 75  | 100 | 50  | 50 |       |
| 15                     | 25 | 75  | 75  | 100 | 75  | 50 |       |
| 16                     | 25 | 75  | 100 | 100 | 75  | 25 |       |
| 17                     | 25 | 50  | 75  | 100 | 75  | 50 |       |
| 18                     | 25 | 75  | 75  | 50  | 50  | 50 |       |
| 19                     | 50 | 75  | 75  | 100 | 75  | 50 |       |
| 20                     | 25 | 50  | 75  | 100 | 75  | 50 |       |
| 21                     | 25 | 75  | 75  | 75  | 100 | 50 |       |
| 22                     | 25 | 75  | 50  | 100 | 75  | 25 |       |
| 23                     | 75 | 50  | 75  | 75  | 75  | 50 |       |
| 24                     | 25 | 75  | 75  | 100 | 75  | 50 |       |
| 25                     | 25 | 75  | 75  | 75  | 75  | 50 |       |
| <b>Average score</b>   | 31 | 70  | 75  | 88  | 75  | 44 | 383   |
| <b>Overall average</b> |    |     |     |     |     |    | 63.83 |

**Table E.56: Household Environmental  
Dedigama**

| Household No.          | Q1 | Q2  | Q3  |       |
|------------------------|----|-----|-----|-------|
| 1                      | 25 | 100 | 100 |       |
| 2                      | 25 | 75  | 100 |       |
| 3                      | 50 | 75  | 100 |       |
| 4                      | 25 | 50  | 100 |       |
| 5                      | 25 | 75  | 75  |       |
| 6                      | 75 | 75  | 100 |       |
| 7                      | 25 | 50  | 100 |       |
| 8                      | 25 | 75  | 75  |       |
| 9                      | 50 | 100 | 100 |       |
| 10                     | 50 | 75  | 100 |       |
| 11                     | 25 | 75  | 50  |       |
| 12                     | 25 | 100 | 100 |       |
| 13                     | 25 | 75  | 100 |       |
| 14                     | 50 | 75  | 100 |       |
| 15                     | 25 | 75  | 100 |       |
| 16                     | 25 | 75  | 75  |       |
| 17                     | 50 | 25  | 100 |       |
| 18                     | 25 | 75  | 100 |       |
| 19                     | 25 | 75  | 75  |       |
| 20                     | 25 | 75  | 75  |       |
| 21                     | 25 | 100 | 75  |       |
| 22                     | 50 | 100 | 100 |       |
| 23                     | 25 | 75  | 75  |       |
| 24                     | 25 | 100 | 100 |       |
| 25                     | 25 | 75  | 100 |       |
| <b>Average score</b>   | 33 | 77  | 91  | 201   |
| <b>Overall average</b> |    |     |     | 67.00 |

**Table E.57: O&M authority survey- Dedigama  
Sustainability dimensions**

| <b>Technical</b>     |          |           |      |      |      |           |           |
|----------------------|----------|-----------|------|------|------|-----------|-----------|
| Question No.         | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
| Q1                   | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q2                   | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3                   | 75       | 25        | 25   | 75   | 50   | 50        | 50        |
| Q4                   | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q5                   | 75       | 75        | 75   | 75   | 75   | 75        | 75        |
| Q6                   | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| <b>Total</b>         |          |           |      |      |      |           | 425       |
| <b>Ave.score</b>     |          |           |      |      |      |           | 70.83     |
| <b>Institutional</b> |          |           |      |      |      |           |           |
| Question No.         | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
| Q1                   | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| Q2                   | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3                   | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q4                   | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q5                   | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| Q6                   | 75       | 75        | 75   | 75   | 75   | 75        | 75        |
| Q7                   | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| Q8                   | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| <b>Total</b>         |          |           |      |      |      |           | 450       |
| <b>Ave.score</b>     |          |           |      |      |      |           | 56.25     |
| <b>Social</b>        |          |           |      |      |      |           |           |
| Question No.         | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
| Q1                   | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| Q2                   | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q3                   | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| <b>Total</b>         |          |           |      |      |      |           | 25        |
| <b>Ave.score</b>     |          |           |      |      |      |           | 8.33      |
| <b>Financial</b>     |          |           |      |      |      |           |           |
| Question No.         | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
| Q1                   | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q2                   | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3                   | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| <b>Total</b>         |          |           |      |      |      |           | 200       |
| <b>Ave.score</b>     |          |           |      |      |      |           | 66.67     |
| <b>Environmental</b> |          |           |      |      |      |           |           |
| Question No.         | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
| Q1                   | 75       | 75        | 75   | 75   | 75   | 75        | 75        |
| Q2                   | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q3                   | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| <b>Total</b>         |          |           |      |      |      |           | 275       |
| <b>Ave.score</b>     |          |           |      |      |      |           | 91.67     |

**Table E.58: O&M authority survey- Dedigama  
Project implementation**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q2               | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| Q3               | 75       | 75        | 75   | 75   | 75   | 75        | 75        |
| Q4               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q5               | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| Q6               | 100      | 100       | 100  | 100  | 100  | 100       | 100       |
| Q7               | 75       | 75        | 75   | 75   | 75   | 75        | 75        |
| Q8               | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| <b>Total</b>     |          |           |      |      |      |           | 625       |
| <b>Ave.score</b> |          |           |      |      |      |           | 78.13     |

**Table E.59: O&M authority survey- Dedigama  
Institutional arrangement**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 25       | 100       | 100  | 75   | 75   | 75        | 75        |
| Q2               | 75       | 25        | 75   | 75   | 100  | 100       | 75        |
| Q3               | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q4               | 75       | 75        | 75   | 75   | 75   | 75        | 75        |
| <b>Total</b>     |          |           |      |      |      |           | 250       |
| <b>Ave.score</b> |          |           |      |      |      |           | 62.5      |

**Table E.60: O&M authority survey- Dedigama  
Backup support system**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 50       | 75        | 50   | 25   | 25   | 75        | 50        |
| Q2               | 50       | 50        | 50   | 50   | 50   | 50        | 50        |
| Q3               | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q4               | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| Q5               | 0        | 0         | 0    | 0    | 0    | 0         | 0         |
| <b>Total</b>     |          |           |      |      |      |           | 150       |
| <b>Ave.score</b> |          |           |      |      |      |           | 30        |

**Table E.61: NGO survey- Dedigama  
Project implementation**

| Question No.      | PO  | CF  | TO  | Ave.score |
|-------------------|-----|-----|-----|-----------|
| Q1                | 100 | 25  | 25  | 50        |
| Q2                | 100 | 100 | 100 | 100       |
| Q3                | 100 | 50  | 75  | 75        |
| Q4                | 100 | 25  | 25  | 50        |
| Q5                | 50  | 50  | 50  | 50        |
| Q6                | 50  | 75  | 100 | 75        |
| Q7                | 75  | 75  | 75  | 75        |
| Q8                | 100 | 50  | 75  | 75        |
| <b>Total</b>      |     |     |     | 550       |
| <b>Ave. score</b> |     |     |     | 68.75     |

**Table E.62: Local authority survey- Dedigama  
Project implementation**

| Question No.     | Chairman | Secretary | TO  | Ave.score |
|------------------|----------|-----------|-----|-----------|
| Q1               | 25       | 25        | 25  | 25        |
| Q2               | 50       | 75        | 25  | 50        |
| Q3               | 50       | 75        | 25  | 50        |
| Q4               | 25       | 25        | 25  | 25        |
| Q5               | 25       | 75        | 50  | 50        |
| Q6               | 50       | 75        | 100 | 75        |
| Q7               | 25       | 25        | 25  | 25        |
| Q8               | 50       | 75        | 100 | 75        |
| <b>Total</b>     |          |           |     | 375       |
| <b>Ave.score</b> |          |           |     | 46.88     |

**Table E.63: Local authority survey- Dedigama  
Institutional arrangement**

| Question No.     | Chairman | Secretary | TO  | Ave.score |
|------------------|----------|-----------|-----|-----------|
| Q1               | 50       | 75        | 25  | 50        |
| Q2               | 50       | 75        | 100 | 75        |
| Q3               | 50       | 50        | 50  | 50        |
| Q4               | 75       | 75        | 75  | 75        |
| <b>Total</b>     |          |           |     | 250       |
| <b>Ave.score</b> |          |           |     | 62.5      |

**Table E.64: Local authority survey- Dedigama  
Backup support system**

| Question No.     | Chairman | Secretary | TO | Ave.score |
|------------------|----------|-----------|----|-----------|
| Q1               | 75       | 75        | 75 | 75        |
| Q2               | 25       | 25        | 25 | 25        |
| Q3               | 50       | 75        | 25 | 50        |
| Q4               | 50       | 50        | 50 | 50        |
| Q5               | 0        | 0         | 0  | 0         |
| <b>Total</b>     |          |           |    | 200       |
| <b>Ave.score</b> |          |           |    | 40        |



**Table E.65: PIU survey- Dedigama  
Project implementation**

| Question No.      | DM  | Engineer | Sociologist | Ave.score |
|-------------------|-----|----------|-------------|-----------|
| Q1                | 100 | 25       | 100         | 75        |
| Q2                | 75  | 75       | 75          | 75        |
| Q3                | 50  | 25       | 75          | 50        |
| Q4                | 50  | 50       | 50          | 50        |
| Q5                | 100 | 25       | 100         | 75        |
| Q6                | 100 | 100      | 100         | 100       |
| Q7                | 75  | 75       | 75          | 75        |
| Q8                | 75  | 75       | 75          | 75        |
| <b>Total</b>      |     |          |             | 575       |
| <b>Ave. score</b> |     |          |             | 71.88     |

**Table E.66: PMU survey- Dedigama  
Project implementation**

| Question No.     | Ch.Engineer | Engineer | Sociologist | Ave.score |
|------------------|-------------|----------|-------------|-----------|
| Q1               | 50          | 100      | 75          | 75        |
| Q2               | 75          | 75       | 75          | 75        |
| Q3               | 100         | 100      | 25          | 75        |
| Q4               | 50          | 50       | 50          | 50        |
| Q5               | 100         | 100      | 100         | 100       |
| Q6               | 100         | 100      | 100         | 100       |
| Q7               | 100         | 100      | 100         | 100       |
| Q8               | 50          | 100      | 75          | 75        |
| <b>Total</b>     |             |          |             | 650       |
| <b>Ave.score</b> |             |          |             | 81.25     |

**Table E.67: NWSDB survey- Dedigama  
Institutional arrangement**

| Question No.     | RM | Engineer | Sociologist | Ave.score |
|------------------|----|----------|-------------|-----------|
| Q1               | 50 | 50       | 50          | 50        |
| Q2               | 50 | 75       | 100         | 75        |
| Q3               | 25 | 25       | 25          | 25        |
| Q4               | 75 | 75       | 75          | 75        |
| <b>Total</b>     |    |          |             | 225       |
| <b>Ave.score</b> |    |          |             | 56.25     |

**Table E.68: NWSDB survey- Dedigama  
Backup support system**

| Question No.     | RM  | Engineer | Sociologist | Ave.score |
|------------------|-----|----------|-------------|-----------|
| Q1               | 75  | 75       | 75          | 75        |
| Q2               | 100 | 50       | 75          | 75        |
| Q3               | 50  | 50       | 50          | 50        |
| Q4               | 50  | 75       | 25          | 50        |
| Q5               | 0   | 0        | 0           | 0         |
| <b>Total</b>     |     |          |             | 250       |
| <b>Ave.score</b> |     |          |             | 62.5      |

**District- Rathnapura**  
**Small town-Kuruwita**  
**Household survey**  
**Sustainability dimensions**

**Table E.69: Household Technical**  
**Kuruwita**

| Household No.          | Q1  | Q2  | Q3  | Q4  | Q5   | Q6 |       |
|------------------------|-----|-----|-----|-----|------|----|-------|
| 1                      | 75  | 100 | 100 | 100 | 100  | 75 |       |
| 2                      | 75  | 100 | 100 | 100 | 100  | 25 |       |
| 3                      | 75  | 75  | 100 | 75  | 75   | 75 |       |
| 4                      | 75  | 75  | 100 | 100 | 75   | 50 |       |
| 5                      | 75  | 75  | 100 | 100 | 50   | 75 |       |
| 6                      | 75  | 100 | 100 | 75  | 75   | 75 |       |
| 7                      | 50  | 100 | 100 | 100 | 5    | 50 |       |
| 8                      | 75  | 75  | 100 | 50  | 75   | 50 |       |
| 9                      | 75  | 100 | 100 | 75  | 75   | 50 |       |
| 10                     | 75  | 25  | 100 | 100 | 75   | 75 |       |
| 11                     | 75  | 100 | 100 | 75  | 50   | 50 |       |
| 12                     | 75  | 50  | 100 | 75  | 75   | 50 |       |
| 13                     | 75  | 75  | 100 | 50  | 75   | 75 |       |
| 14                     | 75  | 25  | 100 | 25  | 75   | 75 |       |
| 15                     | 100 | 75  | 100 | 25  | 75   | 50 |       |
| 16                     | 75  | 25  | 100 | 75  | 75   | 50 |       |
| 17                     | 75  | 75  | 100 | 100 | 50   | 75 |       |
| 18                     | 50  | 50  | 100 | 75  | 100  | 75 |       |
| 19                     | 75  | 75  | 100 | 75  | 75   | 50 |       |
| 20                     | 75  | 50  | 100 | 75  | 50   | 75 |       |
| 21                     | 75  | 75  | 100 | 75  | 100  | 75 |       |
| 22                     | 75  | 50  | 100 | 100 | 50   | 75 |       |
| 23                     | 100 | 75  | 100 | 50  | 25   | 75 |       |
| 24                     | 75  | 25  | 100 | 50  | 100  | 75 |       |
| 25                     | 75  | 75  | 100 | 100 | 25   | 50 |       |
| <b>Average score</b>   | 75  | 69  | 100 | 76  | 68.2 | 63 | 451.2 |
| <b>Overall average</b> |     |     |     |     |      |    | 75.20 |

**Table E.70: Household Institutional  
Kuruwita**

| Household No.          | Q1  | Q2 | Q3 | Q4  | Q5 | Q6  |       |
|------------------------|-----|----|----|-----|----|-----|-------|
| 1                      | 25  | 75 | 50 | 50  | 25 | 50  |       |
| 2                      | 25  | 50 | 50 | 25  | 25 | 75  |       |
| 3                      | 50  | 75 | 50 | 50  | 25 | 25  |       |
| 4                      | 50  | 50 | 50 | 25  | 25 | 50  |       |
| 5                      | 50  | 75 | 50 | 50  | 50 | 75  |       |
| 6                      | 50  | 75 | 50 | 25  | 25 | 25  |       |
| 7                      | 75  | 50 | 50 | 50  | 75 | 75  |       |
| 8                      | 50  | 75 | 50 | 100 | 25 | 50  |       |
| 9                      | 50  | 50 | 50 | 50  | 25 | 50  |       |
| 10                     | 25  | 50 | 50 | 50  | 25 | 100 |       |
| 11                     | 25  | 50 | 50 | 50  | 25 | 100 |       |
| 12                     | 75  | 50 | 50 | 25  | 25 | 75  |       |
| 13                     | 50  | 75 | 25 | 25  | 25 | 100 |       |
| 14                     | 50  | 75 | 50 | 50  | 25 | 25  |       |
| 15                     | 100 | 75 | 50 | 25  | 75 | 50  |       |
| 16                     | 75  | 75 | 25 | 25  | 50 | 50  |       |
| 17                     | 50  | 75 | 50 | 50  | 25 | 50  |       |
| 18                     | 75  | 75 | 25 | 50  | 25 | 75  |       |
| 19                     | 50  | 50 | 50 | 50  | 25 | 50  |       |
| 20                     | 75  | 75 | 50 | 25  | 25 | 75  |       |
| 21                     | 75  | 75 | 25 | 25  | 50 | 25  |       |
| 22                     | 50  | 75 | 50 | 50  | 50 | 100 |       |
| 23                     | 50  | 75 | 25 | 50  | 25 | 75  |       |
| 24                     | 100 | 75 | 50 | 25  | 25 | 25  |       |
| 25                     | 25  | 75 | 25 | 25  | 75 | 75  |       |
| <b>Average score</b>   | 55  | 67 | 44 | 41  | 35 | 61  | 303   |
| <b>Overall average</b> |     |    |    |     |    |     | 50.50 |

**Table E.71: Household Social  
Kuruwita**

| Household No.          | Q1 | Q2  | Q3 | Q4 |       |
|------------------------|----|-----|----|----|-------|
| 1                      | 50 | 50  | 50 | 25 |       |
| 2                      | 50 | 50  | 50 | 25 |       |
| 3                      | 75 | 75  | 75 | 25 |       |
| 4                      | 75 | 50  | 75 | 25 |       |
| 5                      | 50 | 50  | 75 | 25 |       |
| 6                      | 75 | 50  | 50 | 25 |       |
| 7                      | 50 | 25  | 25 | 25 |       |
| 8                      | 50 | 50  | 75 | 25 |       |
| 9                      | 75 | 25  | 75 | 25 |       |
| 10                     | 50 | 50  | 75 | 25 |       |
| 11                     | 75 | 50  | 25 | 25 |       |
| 12                     | 50 | 50  | 75 | 25 |       |
| 13                     | 50 | 100 | 25 | 25 |       |
| 14                     | 75 | 75  | 25 | 25 |       |
| 15                     | 50 | 50  | 25 | 25 |       |
| 16                     | 75 | 75  | 75 | 25 |       |
| 17                     | 50 | 50  | 50 | 50 |       |
| 18                     | 50 | 50  | 75 | 25 |       |
| 19                     | 50 | 75  | 25 | 25 |       |
| 20                     | 50 | 50  | 75 | 50 |       |
| 21                     | 50 | 75  | 25 | 25 |       |
| 22                     | 50 | 50  | 75 | 25 |       |
| 23                     | 50 | 75  | 25 | 25 |       |
| 24                     | 50 | 75  | 75 | 25 |       |
| 25                     | 50 | 75  | 25 | 25 |       |
| <b>Average score</b>   | 57 | 58  | 53 | 27 | 195   |
| <b>Overall average</b> |    |     |    |    | 48.75 |

**Table E.72: Household Financial  
Kuruwita**

| Household No.          | Q1  | Q2  | Q3  | Q4  | Q5  | Q6 |       |
|------------------------|-----|-----|-----|-----|-----|----|-------|
| 1                      | 25  | 50  | 100 | 75  | 100 | 25 |       |
| 2                      | 25  | 50  | 50  | 100 | 75  | 25 |       |
| 3                      | 50  | 75  | 75  | 75  | 100 | 25 |       |
| 4                      | 25  | 100 | 100 | 100 | 100 | 50 |       |
| 5                      | 50  | 50  | 75  | 100 | 100 | 25 |       |
| 6                      | 25  | 100 | 100 | 75  | 50  | 50 |       |
| 7                      | 75  | 50  | 50  | 100 | 75  | 25 |       |
| 8                      | 50  | 50  | 100 | 50  | 100 | 25 |       |
| 9                      | 75  | 75  | 50  | 100 | 50  | 25 |       |
| 10                     | 25  | 50  | 50  | 50  | 100 | 25 |       |
| 11                     | 75  | 50  | 100 | 100 | 75  | 50 |       |
| 12                     | 25  | 75  | 75  | 75  | 100 | 50 |       |
| 13                     | 100 | 25  | 75  | 100 | 100 | 75 |       |
| 14                     | 25  | 25  | 100 | 100 | 50  | 25 |       |
| 15                     | 50  | 50  | 75  | 100 | 100 | 25 |       |
| 16                     | 25  | 25  | 100 | 75  | 50  | 25 |       |
| 17                     | 50  | 50  | 50  | 100 | 50  | 75 |       |
| 18                     | 50  | 50  | 50  | 100 | 100 | 75 |       |
| 19                     | 50  | 50  | 100 | 100 | 50  | 25 |       |
| 20                     | 50  | 75  | 100 | 100 | 100 | 50 |       |
| 21                     | 75  | 50  | 75  | 100 | 75  | 25 |       |
| 22                     | 50  | 75  | 75  | 100 | 100 | 25 |       |
| 23                     | 25  | 75  | 100 | 75  | 100 | 50 |       |
| 24                     | 75  | 75  | 75  | 75  | 75  | 50 |       |
| 25                     | 75  | 75  | 75  | 100 | 100 | 25 |       |
| <b>Average score</b>   | 49  | 59  | 79  | 89  | 83  | 38 | 397   |
| <b>Overall average</b> |     |     |     |     |     |    | 66.17 |

**Table E.73: Household Environmental  
Kuruwita**

| Household No.          | Q1 | Q2 | Q3  |       |
|------------------------|----|----|-----|-------|
| 1                      | 50 | 50 | 75  |       |
| 2                      | 50 | 50 | 25  |       |
| 3                      | 50 | 75 | 75  |       |
| 4                      | 50 | 50 | 75  |       |
| 5                      | 75 | 75 | 75  |       |
| 6                      | 50 | 75 | 100 |       |
| 7                      | 75 | 50 | 75  |       |
| 8                      | 75 | 75 | 100 |       |
| 9                      | 75 | 75 | 75  |       |
| 10                     | 75 | 25 | 75  |       |
| 11                     | 75 | 75 | 75  |       |
| 12                     | 25 | 75 | 100 |       |
| 13                     | 25 | 75 | 75  |       |
| 14                     | 25 | 75 | 75  |       |
| 15                     | 50 | 75 | 75  |       |
| 16                     | 50 | 75 | 75  |       |
| 17                     | 50 | 75 | 75  |       |
| 18                     | 25 | 75 | 75  |       |
| 19                     | 50 | 75 | 50  |       |
| 20                     | 25 | 75 | 25  |       |
| 21                     | 50 | 75 | 75  |       |
| 22                     | 50 | 50 | 75  |       |
| 23                     | 25 | 75 | 50  |       |
| 24                     | 75 | 75 | 75  |       |
| 25                     | 25 | 50 | 25  |       |
| <b>Average score</b>   | 50 | 67 | 70  | 187   |
| <b>Overall average</b> |    |    |     | 62.33 |

**Table E.74: O&M authority survey- Kuruwita  
Sustainability dimensions**

**Technical**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 50       | 50        | 25   | 25   | 25   | 50        | 38        |
| Q2               | 75       | 75        | 50   | 50   | 75   | 75        | 67        |
| Q3               | 100      | 75        | 50   | 50   | 50   | 75        | 67        |
| Q4               | 75       | 75        | 50   | 75   | 25   | 75        | 63        |
| Q5               | 100      | 100       | 75   | 75   | 50   | 100       | 83        |
| Q6               | 100      | 75        | 50   | 50   | 25   | 75        | 63        |
| <b>Total</b>     |          |           |      |      |      |           | 379       |
| <b>Ave.score</b> |          |           |      |      |      |           | 63.19     |

**Institutional**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 75       | 75        | 75   | 50   | 75   | 75        | 71        |
| Q2               | 100      | 100       | 75   | 75   | 75   | 100       | 88        |
| Q3               | 100      | 100       | 75   | 75   | 50   | 100       | 83        |
| Q4               | 50       | 50        | 50   | 50   | 50   | 50        | 50        |
| Q5               | 50       | 50        | 25   | 25   | 25   | 50        | 38        |
| Q6               | 100      | 100       | 100  | 75   | 75   | 100       | 92        |
| Q7               | 75       | 75        | 75   | 50   | 50   | 50        | 75        |
| Q8               | 50       | 50        | 50   | 25   | 25   | 50        | 42        |
| <b>Total</b>     |          |           |      |      |      |           | 538       |
| <b>Ave.score</b> |          |           |      |      |      |           | 67.19     |

**Social**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 50       | 50        | 75   | 50   | 25   | 50        | 50        |
| Q2               | 50       | 25        | 25   | 50   | 25   | 50        | 38        |
| Q3               | 25       | 25        | 25   | 25   | 25   | 25        | 25        |
| <b>Total</b>     |          |           |      |      |      |           | 113       |
| <b>Ave.score</b> |          |           |      |      |      |           | 37.50     |

**Financial**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 75       | 75        | 75   | 50   | 100  | 75        | 75        |
| Q2               | 100      | 75        | 75   | 75   | 100  | 75        | 83        |
| Q3               | 50       | 50        | 25   | 25   | 25   | 50        | 38        |
| <b>Total</b>     |          |           |      |      |      |           | 196       |
| <b>Ave.score</b> |          |           |      |      |      |           | 65.28     |

**Environmental**

| Question No.     | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1               | 50       | 50        | 25   | 25   | 25   | 50        | 38        |
| Q2               | 100      | 75        | 50   | 50   | 50   | 100       | 71        |
| Q3               | 100      | 50        | 50   | 75   | 50   | 100       | 71        |
| <b>Total</b>     |          |           |      |      |      |           | 179       |
| <b>Ave.score</b> |          |           |      |      |      |           | 59.72     |

**Table E.75: O&M authority survey- Kuruwita  
Project implementation**

| Question No.      | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|-------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1                | 100      | 100       | 75   | 75   | 100  | 100       | 92        |
| Q2                | 50       | 50        | 25   | 25   | 25   | 50        | 38        |
| Q3                | 100      | 75        | 75   | 75   | 50   | 75        | 75        |
| Q4                | 75       | 75        | 50   | 50   | 50   | 50        | 58        |
| Q5                | 100      | 100       | 75   | 75   | 50   | 75        | 79        |
| Q6                | 75       | 50        | 75   | 75   | 75   | 50        | 67        |
| Q7                | 75       | 75        | 50   | 75   | 50   | 100       | 71        |
| Q8                | 100      | 100       | 75   | 75   | 75   | 100       | 88        |
| <b>Total</b>      |          |           |      |      |      |           | 567       |
| <b>Ave. score</b> |          |           |      |      |      |           | 70.83     |

**Table E.76: O&M authority survey- Kuruwita  
Institutional arrangement**

| Question No.      | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|-------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1                | 75       | 50        | 50   | 50   | 25   | 25        | 46        |
| Q2                | 75       | 75        | 75   | 50   | 50   | 75        | 67        |
| Q3                | 25       | 50        | 50   | 50   | 50   | 25        | 42        |
| Q4                | 50       | 50        | 50   | 25   | 25   | 25        | 38        |
| <b>Total</b>      |          |           |      |      |      |           | 192       |
| <b>Ave. score</b> |          |           |      |      |      |           | 47.92     |

**Table E.77: O&M authority survey- Kuruwita  
Backup support system**

| Question No.      | Chairman | Secretary | Ex 1 | Ex 2 | Ex 3 | Caretaker | Ave.score |
|-------------------|----------|-----------|------|------|------|-----------|-----------|
| Q1                | 50       | 50        | 25   | 25   | 50   | 25        | 38        |
| Q2                | 50       | 50        | 25   | 25   | 50   | 25        | 38        |
| Q3                | 75       | 50        | 50   | 50   | 25   | 50        | 50        |
| Q4                | 25       | 25        | 50   | 25   | 50   | 50        | 38        |
| Q5                | 0        | 25        | 25   | 25   | 25   | 25        | 21        |
| <b>Total</b>      |          |           |      |      |      |           | 183       |
| <b>Ave. score</b> |          |           |      |      |      |           | 36.67     |



**Table E.78: NGO survey- Kuruwita  
Project implementation**

| Question No.     | PO | CF  | TO  | Ave.score |
|------------------|----|-----|-----|-----------|
| Q1               | 50 | 75  | 75  | 67        |
| Q2               | 75 | 75  | 100 | 83        |
| Q3               | 50 | 75  | 50  | 58        |
| Q4               | 50 | 75  | 75  | 67        |
| Q5               | 75 | 75  | 75  | 75        |
| Q6               | 75 | 75  | 50  | 67        |
| Q7               | 75 | 100 | 50  | 75        |
| Q8               | 75 | 100 | 100 | 92        |
| <b>Total</b>     |    |     |     | 583       |
| <b>Ave.score</b> |    |     |     | 72.92     |

**Table E.79: Local authority survey- Kuruwita  
Project implementation**

| Question No.      | Chairman | Secretary | TO | Ave.score |
|-------------------|----------|-----------|----|-----------|
| Q1                | 100      | 75        | 75 | 83        |
| Q2                | 25       | 50        | 25 | 33        |
| Q3                | 100      | 75        | 50 | 75        |
| Q4                | 25       | 50        | 50 | 42        |
| Q5                | 50       | 100       | 50 | 67        |
| Q6                | 75       | 75        | 50 | 67        |
| Q7                | 25       | 25        | 25 | 25        |
| Q8                | 75       | 100       | 75 | 83        |
| <b>Total</b>      |          |           |    | 475       |
| <b>Ave..score</b> |          |           |    | 59.38     |

**Table E.80: Local authority survey- Kuruwita  
Institutional arrangement**

| Question No.     | Chairman | Secretary | TO | Ave.score |
|------------------|----------|-----------|----|-----------|
| Q1               | 0        | 0         | 25 | 8         |
| Q2               | 50       | 75        | 50 | 58        |
| Q3               | 25       | 25        | 75 | 42        |
| Q4               | 75       | 75        | 50 | 67        |
| <b>Total</b>     |          |           |    | 175       |
| <b>Ave.score</b> |          |           |    | 43.75     |

**Table E.81: Local authority survey- Kuruwita  
Backup support system**

| Question No.     | Chairman | Secretary | TO | Ave.score |
|------------------|----------|-----------|----|-----------|
| Q1               | 25       | 50        | 75 | 50        |
| Q2               | 50       | 50        | 75 | 58        |
| Q3               | 50       | 50        | 25 | 42        |
| Q4               | 25       | 50        | 50 | 42        |
| Q5               | 0        | 0         | 0  | 0         |
| <b>Total</b>     |          |           |    | 192       |
| <b>Ave.score</b> |          |           |    | 38.33     |

**Table E.82: PIU survey- Kuruwita  
Project implementation**

| Question No.      | DM  | Engineer | Sociologist | Av. Score |
|-------------------|-----|----------|-------------|-----------|
| Q1                | 75  | 75       | 75          | 75        |
| Q2                | 75  | 50       | 50          | 58        |
| Q3                | 75  | 75       | 75          | 75        |
| Q4                | 100 | 100      | 75          | 92        |
| Q5                | 100 | 75       | 75          | 83        |
| Q6                | 100 | 100      | 75          | 92        |
| Q7                | 75  | 75       | 75          | 75        |
| Q8                | 75  | 100      | 75          | 83        |
| <b>Total</b>      |     |          |             | 633       |
| <b>Ave. score</b> |     |          |             | 79.17     |

**Table E.83: PMU survey- Kuruwita  
Project implementation**

| Question No.      | Ch. Eng. | Engineer | Sociologist | Ave.score |
|-------------------|----------|----------|-------------|-----------|
| Q1                | 100      | 100      | 75          | 92        |
| Q2                | 75       | 75       | 100         | 83        |
| Q3                | 100      | 75       | 50          | 75        |
| Q4                | 100      | 100      | 75          | 92        |
| Q5                | 75       | 100      | 75          | 83        |
| Q6                | 100      | 100      | 75          | 92        |
| Q7                | 100      | 75       | 75          | 83        |
| Q8                | 75       | 75       | 50          | 67        |
| <b>Total</b>      |          |          |             | 667       |
| <b>Ave. score</b> |          |          |             | 83.33     |

**Table E.84: NWSDB survey- Kuruwita  
Institutional arrangement**

| Question No.      | RM | Engineer | Sociologist | Ave.score |
|-------------------|----|----------|-------------|-----------|
| Q1                | 50 | 25       | 50          | 42        |
| Q2                | 50 | 50       | 25          | 42        |
| Q3                | 75 | 25       | 50          | 50        |
| Q4                | 75 | 75       | 50          | 67        |
| <b>Total</b>      |    |          |             | 200       |
| <b>Ave. score</b> |    |          |             | 50.00     |

**Table E.85: NWSDB survey- Kuruwita  
Backup support system**

| Question No.     | RM | Engineer | Sociologist | Ave.score |
|------------------|----|----------|-------------|-----------|
| Q1               | 75 | 75       | 25          | 58        |
| Q2               | 50 | 50       | 50          | 50        |
| Q3               | 75 | 50       | 25          | 50        |
| Q4               | 50 | 50       | 75          | 58        |
| Q5               | 0  | 0        | 0           | 0         |
| <b>Total</b>     |    |          |             | 217       |
| <b>Ave.score</b> |    |          |             | 43.33     |



## **ANNEX F: Main responsibilities relevant to the operation and maintenance activities in MOU signed for backup support system**

### **CBO**

- Work according to the by laws passed by local authorities.
- O&M plan should be approved by CBO general meeting.
- Water supply facilities should be giving to all consumers within the small town.
- Recruit staff according to the approved O&M plan.
- Train staff with the help of local authority and NWSDB.
- Prepare water tariff according to income and expenditure and approved in CBO general meeting.
- Extensions and developments with the concurrence of local authority.
- Audit CBO accounts from external reputed body.
- Sending of annual audit report to local authority and NWSDB.

### **Local authority**

- Assist to CBOs in managing of water supply system within the prevail law.
- Assist CBOs to execute their O&M plan and coordinating other relevant agencies.
- Guidance should be giving to catchment preservation programs.
- Intervene to resolve conflicts within CBO and other parties on request.
- Help to maintain the water quality in water supply system.
- Attend to CBO general meeting on request.
- Assist in land or assets issues on request.

### **NWSDB**

- Assist in water quality monitoring in water supply system.
- Support in major break downs at cost basis.
- Assist in procurement on highly technical items.
- Guide on selection on water meters and repair them.
- Attend to CBO general meeting on request
- Guide on billing and collection.
- Assist in preparation of water tariff.
- Train staff on operational activities.



**ANNEX G: Photos of five small town water supply systems**



**CBO office**

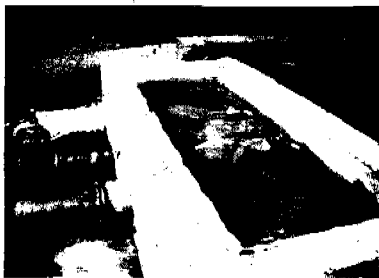


**Ferro cement filter**



**Committee meeting**

**Figure G.1: Saliyawewa water supply system photos**



**Intake arrangement**



**Ground reservoirs**



**Complain register**

**Figure G.2: Kitulgala water supply system photos**



**Open market**

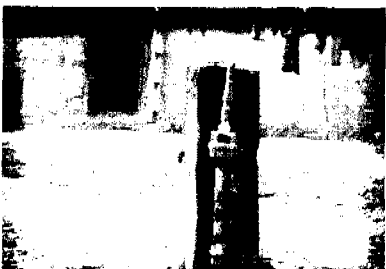


**Cathment area**

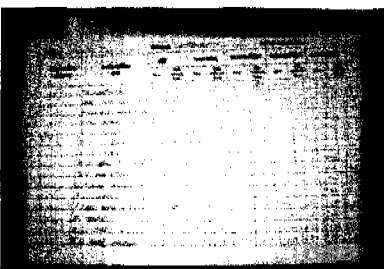


**Borehole chamber**

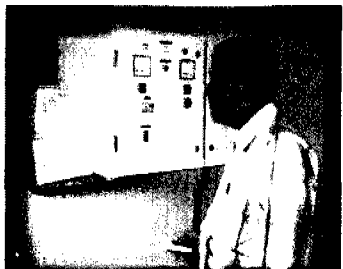
**Figure G.3: Kirimetiyan water supply system photos**



**Water connection**



**Meter reading card**



**Panel and instructions**

**Figure G.4: Dedigama water supply system photos**



**Billing system**



**Generator**



**Ranny well**

**Figure G.5: Kuruwita water supply system photos**