



**JAPAN
BANK FOR
INTERNATIONAL
COOPERATION**

JBICI Research Paper No.19

**Impact Assessment of
Irrigation Infrastructure Development on
Poverty Alleviation:
A Case Study from Sri Lanka**

November 2002

**JBIC Institute
Japan Bank for International Cooperation**

**Joint Research with
International Water Management Institute**

JBICI Research Paper No.19
Japan Bank for International Cooperation (JBIC)
Published in November 2002

© 2002 Japan Bank for International Cooperation
All rights reserved.

This Research Paper is based on the findings and discussions of the JBIC Institute and the International Water Management Institute (IWMI). The views expressed in this Research Paper are those of the authors and do not necessarily represent the official position of the JBIC and the IWMI. No part of this Research Paper may be reproduced in any form without the express permission of the publisher. For further information please contact the Planning and Coordination Division of our Institute.

**Impact Assessment of
Irrigation Infrastructure Development on
Poverty Alleviation:
A Case Study from Sri Lanka**



Foreword

JBIC has been providing Official Development Assistance (ODA) Loans to the recipient countries since the initial loan was launched in March 1966. The total cumulative amount was close to 15 trillion yen (as of July 31, 2002) and more than 50% of this amount was designated for infrastructure development.

The Millennium Development Goals (MDGs) were internationally recognized as a common set of objectives for the period of 1990-2015. The first goal of MDGs is to halve the proportion of people whose income is less than 1 dollar a day and to halve the proportion of people who suffer from hunger. In those Asian countries where infrastructure systems have been improved, rapid economic growth has been achieved. However, it is not yet clear whether infrastructure development reduced poverty and improved the living condition of people, especially the poor. It is highly important to demonstrate the linkage between infrastructure improvement and poverty reduction by observing situations at the micro level.

The study on “Impact Assessment of Irrigation Infrastructure Development on Poverty Alleviation: a Case Study from Sri Lanka” produced under the collaboration of the International Water Management Institute and JBIC Institute is one of the first efforts to make a contribution to research on the social impact of infrastructure development. I believe that this study will shed new light on the linkage between infrastructure development and poverty reduction.

November 2002

Koji FUJIMOTO

Executive Director

JBIC Institute

Japan Bank for International Cooperation

Acknowledgements

This report is the outcome of the research project initiated by the JBIC Institute, the Japan Bank for International Cooperation and undertaken by the International Water Management Institute (IWMI). Several people have contributed, directly or indirectly, to the production of this project. First of all, we are thankful to our survey respondents who furnished information during the three household level surveys and whose cooperation made this study possible. We greatly acknowledge the hard work and active cooperation of field data enumerators and fieldwork supervisors. A word of thanks is due to Mr. J.K. Somasiri, who despite difficult times because of a family tragedy remained devoted to all the three surveys for this study. We extend also special thanks to Mr. Izhar Hunzai for his contributions in the development of the proposal for this project and for his moral support.

We are grateful to the JBIC Institute for providing the financial support as well as intellectual input for this project. Finally, we would like to thank our Director General, Professor Frank Rijsberman; Director Finance and Administration, Mr. Gerard O'Donoghue; and Director Asia, Mr. Ian Makin, and theme leader for WRIP theme, Dr Madar Samad for their continuous support and encouragement for this project.

This study has been undertaken under the collaboration of the following members.

IWMI Team

Intizar Hussain(Team / Project Leader)

Senior Economist

Email: i.hussain@cgiar.org

Fuad Marikar, and

Economist

Sunil Thrikawala

Research Officer

International Water

Management Institute (IWMI)

P.O.Box 2075, Colombo, Sri Lanka

JBIC Institute Team

Naoko Shinkai

Economist

JBIC Institute, JBIC

E-mail:n-shinkai@jbic.go.jp

Yasuyuki Sawada, and

Associate Professor

Graduate School of Economics,

University of Tokyo

E-mail:sawada@stanfordalumni.org

Masahito Aoki

Country Officer

Development Assistance

Department IV, JBIC

E-mail:ma-aoki@jbic.go.jp

Table of Contents

Foreword	i
Acknowledgements	ii
Table of Contents	iii
List of Figures	vii
List of Tables	ix
Executive Summary.	I
Part 1	
Chapter I Study Background	1
1.1 Introduction.	1
1.2 Goal and Objectives	2
1.3 Scope and Coverage	2
1.4 Organization of the Report	4
Chapter II A Brief Review of Literature on Irrigation Infrastructure and Poverty	5
Chapter III Economy, Agriculture and Poverty in Sri Lanka	
An Overview of Key Developments and Trends	10
3.1 Characteristics of Sri Lankan Economy	10
3.2 Characteristics of Agriculture in Sri Lanka-Rainfed and Irrigated	12
3.3 Labor Force in Agriculture	16
3.4 Poverty in Sri Lanka	17
Part 2	
Chapter IV Study Design, Approach and Sampling Framework	26
4.1 Study Inception Activities	26
4.1.1 Selection of Study Areas	26
4.1.2 Field Visits by Team of Economists	27
4.2 Characteristics of Study Areas-General	28
4.2.1 Agro-climatics of Uda-Walawe	28
4.2.2 Socio-economics of Uda-Walawe	31
4.3 Characteristics of Specific Study Sites	32
4.3.1 Sevanagala	32
4.3.2 Kiriibanwewa and Sooriyawewa	33

	4.3.3 Control Sites	34
4.4	Sampling Procedures	35
	4.4.1 Strata 1 and 2-Sevanagala	36
	4.4.2 Stratum 3-Kiriibanwewa	37
	4.4.3 Stratum 4-Sooriyawewa	37
	4.4.4 Stratum 5-Extension Area	38
	4.4.5 Stratum 6-Ridiyagama	38
	4.4.6 Sample Size	39
4.5	Sample Selection within Strata	41
	4.5.1 Strata 1 and 2-Sevanagala	41
	4.5.2 Stratum 3-Kiriibanwewa	41
	4.5.3 Stratum 4-Sooriyawewa	42
	4.5.4 Stratum 5-Extension Area	43
	4.5.5 Stratum 6-Ridiyagama	44
Chapter V	Household Survey Administration and Data Collection	46
	5.1 Questionnaire Development and Pre-testing	46
	5.2 Enumerators Training	47
	5.3 Planning and Implementation of First Survey	49
	5.4 Planning and Implementation of Second and Third Surveys	51
	5.5 Logistical Arrangements for Surveys	53
	5.6 Survey Team	54
	5.7 Data Collection Procedures	54
	5.8 Household Income and Expenditure Diaries	57
	5.9 Field Problems	58
	5.10 Data Entry	59
	5.11 Data Cleaning Process and Quality Control	60
Chapter VI	Analytical Framework	62
	6.1 Analytical Methods	64
	6.2 Defining the Poor and Measuring Poverty	64
	6.3 Income / Expenditure Measures of Poverty	65
	6.3.1 Income Poverty-Concepts of Chronic and Transient Poverty	65
	6.3.2 Income / Expenditure Measures of Poverty	67
	6.3.3 Standard Certainty Equivalence Measure	71
	6.3.4 Defining the Poverty Line	71
	6.3.5 Defining Household Income —Sources of Rural Income	73
	6.3.6 Definition Household Expenditures and Assets	73
	6.4 Other Qualitative Indicators of Poverty	74

6.5	Econometric Analysis	77
6.5.1	Seasonality in Incomes and Expenditures	77
6.5.2	Estimation of the Determinants of Incomes/Expenditures – Quantification of Impacts	79
Part 3		
Chapter VII	Basic Socio-economic Profile of Sample Households: Asset Base and Livelihood Systems	80
Chapter VIII	Estimates of Household Incomes and Expenditures: Distribution Patterns and Income Inequality	89
8.1	Introduction	89
8.2	Income Distribution and Inequality	101
Chapter IX	Dynamics of Poverty: Estimating Chronic and Transient Poverty	107
9.1	Estimates of Income / Expenditure Measures of Poverty	107
9.2	Other Qualitative Indicators of Poverty	124
9.3	Welfare Cost of Income/Expenditure Fluctuations	128
9.4	Formal and Informal Credit Use	129
Chapter X	Seasonality in Incomes and Expenditures: Quantifying the Impacts of Irrigation Infrastructure Development	132
10.1	Sample-1: Sevenagala Irrigated and Extension/Rainfed	140
10.2	Sample-2: Sevenagala Rainfed and Extension/Rainfed	142
10.3	Sample-3: Kiriibbanwewa and Extension/Rainfed	144
10.4	Sample-4: Sooriyawewa and Extension/Rainfed	146
10.5	Sample-5: Ridiyagama and Extension/Rainfed	147
10.6	Sample-6: Irrigated (all) and Rainfed (all)	149
10.7	Sample-7: Farmers (all) and non-farmers (all)	151
10.8	Other Sub-samples	152
10.9	Impact of Irrigation Infrastructure	157
Chapter XI	Impact of Irrigation Infrastructure Development on Poverty Conclusions and Policy Implications	161
11.1	Summary of Findings	166
11.2	Farmer Perceptions on the Impact of Irrigation Infrastructure	170
11.3	Policy Implications and Pro-poor Interventions	171

11.3.1	Development of Irrigation Infrastructure - Small Tanks	171
11.3.2	Land Titles	173
11.3.3	Crop Diversification, Improved Access to Credit and Marketing	173
11.4	Limitations of the Study	174
11.5	Participatory Poverty Assessments ¹ : Summary	175
11.5.1	Status of Infrastructure	175
11.5.2	Income and Housing	176
11.5.3	Irrigation and Other Infrastructure	177
11.5.4	Land Rights	178
11.5.5	Causes of Poverty	178
11.6	Community Suggestions for Addressing the Poverty Issues	179
	References	182
	Appendices	184

¹ Thanks to Mr. Jinapala K. for extending help in organizing and conducting PPA sessions.

List of Figures

Figure 6.1.	Spatial and Temporal Dimensions of Irrigation and Poverty	63
Figure 8.1.	Household Annual Income Across Strata	91
Figure 8.2.	Average Monthly Income Patterns by Strata	92
Figure 8.3.	Average Monthly Income and Expenditure Patterns	94
Figure 8.4.	Monthly Income and Expenditure – Irrigated areas	95
Figure 8.5.	Monthly Income and Expenditure - Rainfed	95
Figure 8.6.	Monthly Income and Expenditure - Farm	96
Figure 8.7.	Monthly Income and Expenditure – Non Farm	96
Figure 8.8.	Monthly Expenditure Patterns	97
Figure 8.9.	Monthly Expenditures by Strata (Rs.)	98
Figure 8.10.	Average Monthly Expenditure by Category of Expenditure	99
Figure 8.11.	Per capita Income Distribution in All Strata	104
Figure 8.12.	Per capita Income Distribution in Irrigated and Rainfed Areas	104
Figure 8.13.	Per capita Income Distribution among Farmers and Non-farmers	105
Figure 8.14.	Per capita Income Distribution among Strata	106
Figure 9.1.	Poverty Head Count by Strata – based on monthly income data	107
Figure 9.2.	Poverty Head Count Category I	114
Figure 9.3.	Poverty Head Count Category II	115
Figure 9.4.	Monthly Poverty Head Count Indices by Strata	118
Figure 9.5.	Poverty Head Count Monthly Indices – Irrigated and Rainfed	119
Figure 9.6.	Annual Poverty Indices	123
Figure 10.1.	Month Effects in Expenditures (Strata 1 vs Strata 5)	142
Figure 10.2.	Month Effects in Expenditures (Strata 2 vs Strata 5)	143
Figure 10.3.	Month Effects in Expenditures (Strata 3 vs Strata 5)	145
Figure 10.4.	Month Effects in Expenditures (Strata 4 vs Strata 5)	147
Figure 10.5.	Month Effects in Expenditures (Strata 6 vs Strata 5)	148
Figure 10.6.	Month Effects in Expenditures (Irrigated vs Rainfed)	150
Figure 10.7.	Month Effects in Expenditures (Farmer vs Non-farmer)	152
Figure 10.8.	Month Effects in Expenditures (Strata 1 vs Strata 6)	153
Figure 10.9.	Month Effects in Expenditures (Strata 3 vs Strata 6)	154
Figure 10.10.	Month Effects in Expenditures (Strata 4 vs Strata 6)	155
Figure 10.11.	Month Effects in Expenditures (Strata 3 vs Strata 4)	156
Figure A1.	Monthly Farm Income By Block	186
Figure A2.	Monthly Farm Income by Category	186
Figure A3.	Monthly Transfer Income by Block	188
Figure A4.	Transfer Income by Category	188
Figure A5.	Monthly Non Farm Income by Strata	190

Figure A6.	Non Farm Income by Category	190
Figure B1.	Monthly Food Expenditure by Strata	193
Figure B2.	Food Expenditure by Category	193
Figure B3.	Monthly Non-food Expenditure by Strata	195
Figure B4.	Non-food Expenditure by Category	195
Figure B5.	Household Monthly Income and Expenditure–Sevanagala Irrigated	197
Figure B6.	Household Monthly Income and Expenditure–Sevanagala Rainfed	198
Figure B7.	Household Monthly income and Expenditure – Extension Area	198
Figure B8.	Household Monthly Income and Expenditure - Ridiyagama	199
Figure B9.	Monthly Income and Expenditure - Irrigated	199
Figure B10.	Household Monthly Income and Expenditure - Rainfed	200
Figure B11.	Monthly Income and Expenditure - Farm	200
Figure B12.	Household Monthly Income and Expenditure – Non Farm	201

List of Tables

Table 3.1.	Land Use in Sri Lanka	12
Table 3.2.	Incidence, Depth and Severity of Poverty in Sri Lanka by Sector: 1985/86, 1990/91, and 1995/96 – Reference Poverty Line	18
Table 3.3.	Incidence, Depth and Severity of Poverty in Sri Lanka by Sector: 1985/86, 1990/91, and 1995/96 – Higher Poverty Line	19
Table 3.4.	Incidence, Depth and Severity of Poverty in Sri Lanka by Sector: 1996/97 – By Reference Poverty Line	20
Table 4.1.	Total Annual Rainfall in Uda Walawe – ten year averages (mm / year)	29
Table 4.2.	Monthly Rainfall in Uda Walawe Reservoir Area (mm)	29
Table 4.3.	Soil Type by Area in the Uda Walawe System	30
Table 4.4.	Farm and Non-farm Households in the Selected Study Sites	32
Table 4.5.	Villages in Mayurapura (Extension Area)	34
Table 4.6.	Selected Strata and Sample Size	39
Table 4.7.	Selected Strata and Planned Sample Size (farm / non- farm households)	40
Table 4.8.	Selected Strata and Actual Sample Size (farm / non- farm households)	40
Table 4.9.	Selected Sample in Sevanagala (farm/non- farm households)	41
Table 4.10.	Selected Sample in Kiri-ibbanwewa (farm / non- farm households)	42
Table 4.11.	Selected Sample in Sooriyawewa (farm / non- farm households)	43
Table 4.12.	Selected Sample in Extension Area (farm / non-farm households)	44
Table 4.13.	Selected Sample in Ridiyagama (farm / non- farm households)	45
Table 5.1.	Summary of Survey Implementation Schedule	51
Table 7.1.	Summary Description of Sample Areas	80
Table 7.2.	Selected Basic Characteristics of Sample Households	81
Table 7.3.	Land Distribution Pattern	82
Table 7.4.	Basic Characteristics of Agriculture and Profitability of Crop Production	84
Table 7.5.	Cost of Crop Production	85
Table 7.6.	Employment Status of Sample Households	86
Table:7.7.	Average Wage Rates by Strata (Rs/day)	87
Table 7.8.	Structure of Household Income	88
Table 8.1.	Estimates of Average Monthly Incomes Across Strata	91
Table 8.2.	Monthly Expenditure Patterns by Strata	97
Table 8.3.	Monthly Food Expenditure Patterns	100
Table 8.4.	Average Annual Expenditure of Sample Households by Category	101
Table 8.5.	Source of Income of Sample Households	102
Table 8.6.	Income Distribution by Strata and Occupation	103

Table 9.1.	Poverty Head Count - Income	107
Table 9.2.	Poverty Head Count – Income – Categories I & II	113
Table 9.3.	Poverty Gap – Income – Categories I & II	115
Table 9.4.	Poverty Gap Squared– Income – Categories I & II	116
Table 9.5.	Poverty Head Count – Income (Monthly Indices)	117
Table 9.6.	Poverty Gap – Income (Monthly Indices)	118
Table 9.7.	Poverty Gap Squared – Income (Monthly Indices)	120
Table 9.8.	Poverty Head Count – Based on Household Income – Quarterly Data	121
Table 9.9.	Annual Poverty Indices	123
Table 9.10.	Estimates of Qualitative Indicators of Poverty	127
Table 9.11.	Welfare Cost of Fluctuations in Expenditures	129
Table 9.12.	Formal and Inform Credit Use	131
Table 10.1.	Deflation Factor Using Greater Colombo Consumer Price Index	135
Table 10.2.	Regression Results – General Model	136
Table 10.3.	Sample 1: Strata 1 (Sevanagala Irrigated) and Strata 5 (Extension/Rainfed)	141
Table 10.4.	Sample 2 : Strata2 (Sevanagala-Rainfed) and Strata 5 (Extension/Rainfed)	143
Table 10.5.	Sample3 : Strata3 (Kiriibbanwewa) and Strata 5 (Extension/Rainfed)	145
Table 10.6.	Sample 4 : Strata4 (Sooriyawewa) and Strata 5 (Extension/Rainfed)	146
Table 10.7.	Sample 5 : Strata 6 (Ridiyagama) and Strata 5 (Extension/Rainfed)	148
Table 10.8.	Sample 6: Irrigated and Rainfed	150
Table 10.9.	Sample 7: Farmer and Non-farmer	151
Table 10.10.	Sample 8: Sevanagala Irrigated and Ridyagama	153
Table 10.11.	Sample 9: Kiriibbanwewa and Ridyagama	154
Table 10.12.	Sample 10: Sooriyawewa and Ridyagama	155
Table 10.13.	Sample 11: Kiriibbanwewa and Sooriyawewa	156
Table 10.14.	Regression Results – Determinants of Annual Expenditures/Incomes	160
Table 11.1.	Current Status of Irrigation Infrastructure Development	176
Table 11.2.	Household Incomes	176
Table 11.3.	Condition of Houses	177
Table 11.4.	Services Available	177
Table 11.5.	Ownership of Land	178
Table 11.6.	Poverty Situation and Causes – Community Perceptions	179
Table 11.7.	Community Suggestions for Poverty Alleviation	180

Table A 1.	Total Monthly Farm Income (Rs.)	185
Table A 2.	Total Monthly Transfer Income (Rs.)	187
Table A 3.	Total Monthly Non -Farm Income (Rs.)	189
Table A 4.	Household Average Monthly Total Incomes	191
Table B 1:	Household Average Monthly Food Expenditure by Strata and Category	192
Table B 2.	Household Average Monthly Non-Food Expenditures (Rs.)	194
Table B 3.	Household Average Monthly Non-food Expenditures (i.e. category 3- non-durable)	196
Table B 4.	Household Average Monthly Other Expenditures (i.e. durable expenditures)	196
Table B 5.	Household Average Monthly Total Expenditures	197
Appendix Table C 1.	Poverty Head Count – Based on Monthly Expenditure	202
Appendix Table C 2.	Poverty Head Count – Based on Household Monthly Expenditure Categories I & II	202
Appendix Table C 3.	Poverty Gap – Based on Household Monthly Expenditure – Categories I & II	203
Appendix Table C 4.	Poverty Gap Squared – Based on Household Monthly Expenditure – Categories I & II	203
Appendix Table C 5.	Poverty Head Count – Based on Household Monthly Expenditure (Monthly Indices)	204
Appendix Table C 6.	Poverty Gap – Based on Household Monthly Expenditure(Monthly Indices)	204
Appendix Table C 7.	Poverty Gap Squared – Based on Household MonthlyExpenditure (Monthly Indices)	205
Appendix Table D 1.	Poverty Head Count (Quarterly Indices) –Based on Household Income – Quarterly Data	206
Appendix Table D 2.	Poverty Head Count – Based on Household Expenditures –Quarterly Data	206
Appendix Table D 3.	Poverty Head Count (Quarterly Indices) –Based on Household Expenditures – Quarterly Data	207
Appendix Table E1	Table: Body Mass Index	209
Appendix Table F 1.	Welfare Cost of Fluctuations in Household Monthly Incomes Based on Monthly Income Data	211
Appendix Table F 2a.	Welfare Cost of Fluctuations in Household Expenditures Based on Quarterly Expenditure Data	211
Appendix Table F 2b.	Welfare Cost of Fluctuations in Household Income Based on Quarterly Income Data	212
Appendix Table G.1.	Regression Results – Determinants of Annual Expenditure(Income)	213

Appendix Table G.2.	Regression Results – Determinants of Annual Expenditure (Income) – Irrigated versus Non-Irrigated	213
Appendix Table G.3.	Regression Results – Determinants of log Annual Expenditure (Income) – Irrigated versus Non-Irrigated	214

Executive Summary

Main activities of the study consisted of (1) selecting suitable study areas and specific study sites, (2) developing a detailed sampling framework, (3) developing a panel data base by undertaking household level surveys during the year (2001) to cover 'before', 'during', and 'after' situations both for the wet and dry seasons of the year, and (4) undertaking econometric analyses of the impacts of irrigation infrastructure on poverty. The overall goal of the study is to develop an in-depth understanding of income dynamics in relation to access to irrigation water and to comprehensively evaluate the impact of irrigation infrastructure on poverty. Irrigation systems in Sri Lanka and Pakistan, where JBIC has funded their development/improvements/rehabilitation were selected as study areas. This report provides output of the Sri Lankan component of the study.

The study uses primary data collected through household surveys conducted three times during the year 2000-2001, from a sample of 858 households, using a detailed multi-topic questionnaire. The study was undertaken in Benchmark Basin - Uda Walawe Left Bank Irrigation System (WLB) in Uda Walawe area (Ruhuna Basin) in Sri Lanka. The study area exhibits considerable variability in cropping patterns. Main crops grown in the area include paddy, sugarcane, banana and other upland crops. Type of farming in the study area varies from irrigated to rain-fed to Chena cultivation. Demographically, there is a mix of government allottees, encroachers and non-farm households in the area. Since the entire irrigation infrastructure in the WLB irrigation system has already been rehabilitated/upgraded/improved, adjacent rainfed area and an irrigation system with the same source of water but without infrastructure upgrading/improvement were selected as control sites for comparison purposes.

The study area was divided into six strata based on criteria including: availability or non-availability of irrigation infrastructure, improved or unimproved irrigation infrastructure; cropping pattern, and availability or non-availability of water for irrigation in Maha 2000. A multistage sampling procedure was adopted for selecting the sample households in each stratum. The study employs a 'with' and 'without' approach by comparing sample areas with well developed/improved, less developed/unimproved and with no infrastructure and without irrigation to establish irrigation accessibility.

The overall approach to comprehensively assess the impacts of irrigation infrastructure on poverty, covering its both spatial and temporal aspects, consists of (1) comparing various strata representing the state of infrastructure

development – quantifying the differences in the value of relevant variables by developing a socio-economic profile for each strata. (2) developing and quantifying key indicators of poverty – covering both income / expenditure and qualitative dimensions of poverty. (3) estimating household income/ consumption smoothing effects of irrigation infrastructure development through econometric analysis, and (4) identifying and quantifying key determinants of household incomes/expenditures/poverty including quantifying the impact of irrigation infrastructure development on these variables through econometric analysis. [It should be clear at the outset that the study is based on inter-household analysis and does not look into intra-household poverty structures].

The results of this study provide strong empirical evidence on the role of irrigation infrastructure development on poverty alleviation, particularly on dynamic aspects of poverty. The findings suggest that the incidence, depth and severity of poverty, as measured by income / expenditure indicators, are the highest in areas without irrigation infrastructure and lowest in areas with access to established irrigation infrastructure and with adequate water supplies. The study provides quantitative estimates of both transient and chronic poverty. In addition, the study quantifies and compares qualitative indicators of poverty and shows how access to irrigation infrastructure development contributes to poverty reduction and raises overall welfare standards. Further, the study econometrically estimates expenditure smoothing effects of access to irrigation infrastructure. Finally, the study develops a multivariate econometric model to quantitatively assess the impact of various factors, including household access to irrigation infrastructure, endowment of land resources, land productivity, household human resources, household non-land productive assets and so on and so forth, on household incomes/expenditures. The model provides quantitative estimates of the potential increases in incomes and expenditures through development of infrastructure and improved access to adequate water supplies.

Summary of Findings

- ◆ Irrigation infrastructure has a beneficial impact, in terms of reducing poverty, particularly in reducing the incidence of chronic poverty, provided adequate supplies of water are available.
- ◆ The benefits of upgraded irrigation infrastructure over non-upgraded systems are less apparent. The availability of water appears to be more important as a factor in reducing poverty, and upgraded infrastructure becomes important as far as it contributes to increased water supplies (both upstream and downstream).

- ◆ The dependency ratio and under five mortality rates are relatively higher in areas without access to irrigation infrastructure compared to areas with access to irrigation infrastructure.
- ◆ A comparison of Body Mass Index (BMI) across strata indicates no significant differences. There are only few instances of underweight children. In general, BMI for households in irrigated areas shows an increase from survey one (June) to survey three (October). However, in rainfed areas, BMI for all age groups declines in the second period (August) and increases during the third period (October) but does not reach the level of the first period (June) values. BMI for non-farm households is generally lower than that for farm households.
- ◆ A larger proportion of the school-aged population not in school is in areas without access to irrigation infrastructure compared to areas with access to irrigation infrastructure.
- ◆ The cropping intensity is low in the typical rainfed areas. However it is high in rainfed areas with good moisture retaining soils, systematic cropping and marketing facilities.
- ◆ Although farm sizes are larger in rainfed areas, there appears to be a relationship between poverty and land size. The chronically poor population had smaller land holdings than either the transient poor or the non-poor.
- ◆ Income levels are lower in rainfed areas. Income peaks during the year coincide with availability of water for cultivation. In double-cropped areas there are two peaks in income and in single cropped areas, a single peak in income.
- ◆ Labor use per hectare and wage rates are lower in areas without access to irrigation infrastructure (Extension/rainfed -Rs. 173/day) compared to areas with access to irrigation infrastructure. (above Rs.194/day)
- ◆ Incomes and expenditures are higher in areas with access to irrigation infrastructure compared to areas with access to irrigation infrastructure, but the patterns of monthly incomes and expenditures are similar in both areas.
- ◆ Non-crop income makes up to 75 percent of total income in areas without access to irrigation infrastructure, compared to 50 percent in areas with access to irrigation infrastructure.
- ◆ Income inequality is only moderate in both with and without access to irrigation infrastructure. In areas where average incomes are high, income distribution is relatively more skewed. Differences in income inequality across strata are mainly due to variation in size of holdings, availability of irrigation water, opportunities for diversified cropping and availability of non-agricultural sources of income.
- ◆ The welfare cost of income and expenditure fluctuations is only marginally lower in areas with access to irrigation infrastructure compared to areas

without access to irrigation infrastructure.

- ◆ Using quarterly income data, 16 percent of the sample population is classified as the chronically poor, 59 percent as the transient poor and 25 percent as non-poor.
- ◆ Using annual data, 35 percent of the sample population is classified as poor (including the transient poor).
- ◆ Incidence of chronic poverty is highest in areas without access to irrigation infrastructure (typical rainfed areas) compared to areas with access to irrigation infrastructure. However, the incidence of transient poverty is high in both areas.
- ◆ Overall, highest chronic poverty is found among non-farm households, and in areas with no access to irrigation infrastructure and lowest in areas with access to irrigation infrastructure and adequate water supplies. This is regardless of whether monthly or quarterly data are used.
- ◆ The typical rainfed area as characterized by the Extension area had a high proportion of its population earning monthly incomes less than 50 percent of the poverty line.
- ◆ Household monthly expenditures in areas with access to irrigation infrastructure are, on average, are 24 percent higher than in areas with no access to irrigation infrastructure.
- ◆ Production activities in areas with access to irrigation infrastructure also provide livelihood support to households in areas with no irrigation infrastructure.
- ◆ Variations in monthly household expenditures depend on the level of average monthly incomes, month effects (prices and preferences), and to some extent on monthly income share/timing of income flows. The results indicate that monthly variations in consumption expenditures, that is, month effects in expenditures, are higher for households in irrigated areas compared to those in rainfed areas, and higher for farm households compared to non-farm households. Expenditures in August and September (Yala season) are much higher for households in strata with irrigation infrastructure compared to those households in strata without irrigation infrastructure, and it is this difference that influences the pattern of expenditures across months. These results are clearer in comparison of households in irrigated areas (all) with those in rainfed areas. Month effects in expenditures for households in irrigated areas are higher and significant for all months, and patterns of monthly expenditures are different, especially during August and September. The results from these comparisons imply that household groups who have different income patterns, also have different expenditure patterns (although not in all months), suggesting that in addition to average monthly incomes

and pure month effects (preferences, prices), timing of income receipts do influence monthly expenditures (the case of imperfect smoothing). Household access to infrastructure helps in improving average incomes and increasing monthly incomes during the dry season period. Therefore, households with access to irrigation infrastructure are in better position to smooth their expenditures compared to those without it. It is concluded that variations in monthly expenditures depend on the level of average monthly incomes, month effects (prices and preferences), and to some extent on monthly income share/timing of income flows. Overall, the results of the study imply that irrigation infrastructure helps to reduce income fluctuations and enable households to smooth their consumption.

- ◆ Education level of households' heads, number of family earners, landholdings, gross value of product, household assets, and access to irrigation infrastructure with adequate water supplies are the key determinants of household expenditure/income levels.
- ◆ Majority of the sample households believe that upgrading of the system/canal lining saved water and reduced labor requirement for irrigating their fields. A few believed that upgrading increased cropped areas, crop yields, and reduced water logging. On the other hand, many households indicated that infrastructure upgrading by lining of canals reduced seepage to their home gardens.

The study provides strong empirical evidence that irrigation infrastructure does have a positive impact on poverty alleviation. Areas without access to irrigation infrastructure and adequate water supplies have the highest incidence, depth and severity of poverty. Areas with access to irrigation infrastructure generally have lower levels of chronic poverty and a higher proportion of non-poor. However, these areas also have significant incidence of transient poverty.

The analysis of qualitative indicators of poverty such as dependency ratio, mortality rate of children below five years, housing, education and other facilities, clearly demonstrates that households with access to irrigation infrastructure are socio-economically better off than households without access to irrigation infrastructure. The availability of water is critical to obtaining regular incomes and even in irrigated areas with access to irrigation infrastructure, the lack of water could result in lower incomes. Factors such as adequate water, marketing facilities, and systematic cropping can help to reinforce and boost the benefits from irrigation infrastructure.

Based on the analysis and evidence presented, one may conclude that access

to irrigation infrastructure has significant impacts on poverty alleviation. Irrigation infrastructure can help lift both farm and non-farm households out of permanent or chronic poverty, by increasing productivity, employment, incomes, expenditures, and indirectly by enhancing related economic activities. Along with infrastructure development, availability of water is critical to the achievement of the stated benefits. Inadequate water supplies will reduce the impact of infrastructure on poverty, even if the infrastructure is well developed. Poor maintenance can lead to reduced water supplies and negate any positive impact on poverty alleviation. Similarly, even if water supply is adequate and the infrastructure is well maintained, the cultivation of low value crops or the absence of marketing facilities can reduce the impact of infrastructure on poverty.

Part 1

Chapter I Study Background

1.1 Introduction

Over the last decade the focus of major development lending and aid agencies has gradually shifted towards the alleviation of poverty in developing countries. Poverty alleviation has now become one of the most important goals of development assistance. The perception of poverty, too, has changed in recent years, from the popular static concept of poverty to a dynamic one such as chronic and stochastic or transient poverty. Recent studies show that transient poverty accounts for a major part of overall poverty in developing countries. Since the poor are vulnerable and susceptible to exogenous negative shocks due to natural disasters such as drought, flood, typhoon, etc, providing households with coping strategies against the emergence of such temporary poverty becomes an important policy target.

It is generally believed that irrigation infrastructure development provides large benefits to the production activities in agriculture. The development of irrigation infrastructure contributes to increased productivity and raises long-term production and income levels. It is generally recognized that irrigation infrastructure, by providing access to irrigation water, enables small and poor households to better manage risks and reduce income fluctuations caused by drought or other seasonal climatic fluctuations. This income stabilization and smoothing effect of infrastructure is assumed to contribute to transient poverty reduction by helping consumption smoothing. There is a large body of research showing that irrigation infrastructure contributes to socio-economic uplift and overall economic development. However, as Lipton and Ravallion (1995) and Jimenez (1995) indicate that research clearly analyzing the direct influence of infrastructure development on poverty alleviation is very limited. A recent review, by Sawada (2000), on the role of infrastructure in reducing chronic and transient poverty clearly indicates the need for empirical research in understanding the dynamics of poverty in irrigated agriculture and the role of infrastructure development in reducing chronic and transient poverty.

Irrigated agriculture provides the bulk of food and food security in the Asian region. At present, 40 percent of the cropland in Asia is irrigated and accounts for 70 percent of total cereal production. The population of Asia, already the most

populous region in the world, is expected to grow to over 4.2 billion by 2025. Poor people are the most vulnerable to variability in the supply and quality of water available for agricultural uses. Irrigation sector interventions, therefore, must consider programs that contribute most effectively to poverty reduction. This requires a proper analysis of the various dimensions of poverty in diverse socioeconomic conditions, and a better understanding of the dynamics of poverty in irrigated agriculture and the role played by irrigation infrastructure development in poverty alleviation.

1.2 Goal and Objectives

The goal of the study is to evaluate the efficacy of using irrigation infrastructure development as a policy instrument for poverty alleviation in developing countries. The objective is to make an assessment of infrastructure development by using the concepts of transient and chronic poverty, taking an irrigation project as a case study.

The study aims to fill a major gap in the literature on the role of irrigation infrastructure in poverty reduction. This study formally investigates the dynamic poverty reduction effects of irrigation infrastructure development by integrating field observations, economic theory, and econometric analysis. By using the quantitative evaluation results, the study also derives in a rigorous manner the policy implications for future infrastructure development.

Specific objectives of the study are:

1. To assess the impact of irrigation infrastructure development on poverty alleviation taking JBIC financed irrigation projects as case studies.
2. To develop a set of indicators and an analytical method by which to measure the impact of irrigation infrastructure development on poverty alleviation.
3. To establish a panel database for impact assessment and to understand the dynamics of poverty in the selected study areas.

1.3 Scope and Coverage

This is quite extensive in the sense that it is attempting to evaluate both the static as well as the dynamic aspects of poverty in relation to irrigation infrastructure development. The scope and coverage of the study include the following:

1. Undertake assessments of the impacts of irrigation infrastructure development on poverty taking selected JBIC funded projects as case studies – the Uda Walawe area in Sri Lanka (Uda Walawe Left Bank Irrigation System)
2. Establish a detailed methodology including all inputs, outputs and data requirements for the study. Develop an analytical framework, including indicators of poverty, to analyze inter-temporal changes in income and consumption.
3. Develop a sampling framework for the study based on several criteria including access to irrigation water, cropping patterns and stage of development of irrigation infrastructure and select representative sample areas. Identify specific locations within the selected areas, which represent various states of irrigation infrastructure development: well established/developed/improved, partially developed/improved, unimproved and with no infrastructure.
4. Carry out household surveys three times over a period of 10 months beginning May 2001, of a representative sample of over 850 households in order to establish the panel database.
5. Evaluate the impact of irrigation infrastructure on poverty reduction using a “with and without” approach, comparing sample areas of various degrees of irrigation infrastructure development: improved, unimproved, no infrastructure and without irrigation to construct the optimal mix of irrigation accessibility in each of the selected areas.
6. Compare the inter-temporal movements of income and consumption (e.g., variance and means) of household income and consumption in the surveyed areas. Through this quantitative evaluation, assessing the impact of the irrigation infrastructure on dynamics of poverty in selected locations, assuming that other conditions such as climate, soil, and access to the market is more or less similar across the selected areas and locations in order to control those external factors in the analysis.
7. Carry out an econometric analysis of household level panel data to investigate the impacts of irrigation infrastructure development on dynamic poverty reduction.

1.4 Organization of the Report

This report is organized into three parts consisting of 11 chapters. Part 1 (chapters 1, 2, and 3) provides background material for the study. Chapter 2 provides a brief review of literature on the impact of irrigation infrastructure development on poverty. Chapter 3 gives an overview of key developments and trends in Sri Lankan economy, its agricultural sector, and poverty situation and trends in the country. Part 2 (chapters 4, 5 and 6) provides details of study methodology. Overall study design, approach, and sampling framework are discussed in chapter 4, with details on household level survey administration and data collection procedures in chapter 5. Chapter 6 develops an analytical framework of the study. Part 3 (chapters 7, 8, 9, 10, and 11) reports results of the study. Basic socio-economic profile of sample households is given in chapter 7, followed by analyses of household income and expenditures and distribution patterns in chapter 8. Chapter 9 provides detailed estimates of chronic and transient poverty. Econometric analysis of seasonality in incomes and expenditures, and quantitative estimates of impact of infrastructure development on poverty are provided in chapter 10. Summary of study findings, conclusions, and policy implications are provided in the final chapter. Other information, including detailed descriptive statistics are given in the Appendices of the report.

Chapter II A Brief Review of Literature on Irrigation Infrastructure Development and Poverty

Poverty is usually defined as a state in which a household's or individual's living standard is below the poverty line. If a household's living standard is always below the poverty line, that household is considered to be in a state of chronic poverty. If the household's living standard is usually above the poverty line, but falls below it at times, or has the potential to fall below the poverty line, such a state is defined as transient poverty or short-term poverty or temporary poverty. Much effort has been made in the past to study the various aspects of poverty, including the measurement, causes and determinants. The role of infrastructure in alleviating poverty is an area of study that is currently receiving much attention. It has been argued that most of the poor are concentrated in rural areas and depend heavily on agriculture. Therefore rural infrastructure development, or irrigation development, in particular, is believed to increase returns from agriculture, thereby reducing poverty.

Results of the studies undertaken on the impact of infrastructure on poverty suggest that infrastructure development can have a beneficial impact on the poor. There is some evidence to suggest that infrastructure does play an important role in reducing both chronic as well as transient poverty. Raising the productivity of the poor requires a sustained investment in infrastructure development, particularly rural infrastructure, which raises agricultural production and thus permanent incomes of the poor, which reduces chronic poverty in the long run (Lipton & Ravallion, 1995).

A study on infrastructure and poverty in Vietnam (Van de Walle, 1996) simulated the benefits from irrigation, using certain assumptions on how the benefits would be distributed. The study showed that the gains of the poor from irrigation infrastructure development would be higher than the gains of the non-poor, and therefore the benefits would be re-distributive in nature. The greatest gains of the poor would be from the expansion of irrigation to households with small land holdings. The rate of return from irrigation would be in the region of 20 percent. However, constraints other than those due to lack of irrigation would equally reduce the benefits of irrigation to both the poor and non-poor. One should keep in mind that Vietnam is a country with high levels of income poverty where every type of infrastructure is in poor shape. Under those circumstances, benefits from expanding a particular infrastructure system would be reduced. Net marginal benefit from irrigation increases with education, therefore, the gains of the poor who are usually less educated, would be less than the gains of more

educated non-poor.

A recent review of the literature on the role of infrastructure by Sawada (2000) highlights the importance of the dynamic aspects of poverty, specifically chronic and transient poverty aspects, in relation to the role of infrastructure in poverty reduction and the associated policy interventions. Conventional static indicators such as the Foster-Greer-Thorbecke (FGT) indicators are useful in determining poverty targets, particularly in determining public allocation between regions at different poverty levels according to the index. However, Sawada argues that conventional static indicators of poverty are unable to capture the differences between transient and chronic poverty effectively. These indicators use static information on average income and consumption levels, and social indicators over a period or a particular point in time and therefore cannot grasp the problem of dynamic poverty or changes in the state of poverty over time. This could result in advocacy of inappropriate measures/policies for poverty alleviation.

Recent research by Jalan and Ravallion (2001) raises an important question: Are the determinants of chronic and transient poverty different? and do policies that reduce transient poverty also reduce chronic poverty? Their studies in China suggest that some of the factors determining transient poverty do not matter to chronic poverty. They found that while a household's average wealth holding is an important determinant for both transient and chronic poverty, household demographics (such as education levels and health status), while important for chronic poverty, are not significant determinants of transient poverty. Results of their studies suggest that different types of policies will be needed to address the two types of poverty. They conclude that while China's poor area development program may well be an appropriate policy response to reduce chronic poverty, it is unlikely to reduce consumption variability and transient poverty. Additionally, policy instruments such as seasonal public works, credit schemes, and insurance options for the poor may be needed to smooth consumption and to reduce transient poverty.

Transient poverty is most common in agriculture. Since agricultural production involves high risk and is seasonal by nature, the income of farmers tends to vary according to the season, while net income changes according to the level and use of inputs and variability of output. Farmers face a variety of risks, including output and input price fluctuations, which tend to have a negative influence on the household welfare. Tropical diseases can cause a severe reduction in household income. The basic problem faced by a household in a developing

country is how to reconcile variable income flow with a stable consumption pattern. Farmers manage agricultural production risks through various means, including, crop diversification, use of low risk technologies, business relationship through kinship and ethnicity, and other traditional ways. Studies using Pakistani household data (Kurosaki, 1998) show that reduction of risks resulted in a 20 percent drop in the welfare of the small farmers. Risk coping strategies for avoiding temporary poverty (as summarized by Sawada, 2000), include, " self insurance" or consumption smoothing to adjust their resources inter-temporarily and "mutual insurance" or informal risk sharing arrangements among family members, relatives, neighbors and friends. Sawada describes five strategies for self-insurance. The first strategy for consumption smoothing adopted by the poor is to lower the quality of consumption (substitution of cheaper food with the same nutritional value, e.g. soybean instead of meat or fish) and reduce expenditures on health, education and other 'luxury' goods. Other strategies for self-insurance include borrowing, selling of own physical assets, or drawing on savings; greater use of own human assets like joining the labor market, and obtaining gifts/money from relatives and friends.

Mutual insurance or risk sharing refers to the informal reciprocal transfers that take place among family members, relatives, friends, and neighbors in times of need. This coping strategy has evolved through years of developing relationships based on trust, reciprocity, and mutual assistance within rural communities in developing countries, arising from the need to find alternatives to the less accessible commercial insurance and credit markets. Studies done by several researchers (Townsend 1994, 1995, Deaton 1997, Jalan and Ravallion 1996, Gillani 1996, Kurosaki and Sawada 1999) showed that, although a perfect risk sharing hypothesis was rejected statistically, about 60 to 70 percent of income fluctuations were absorbed by some form of risk sharing or mutual insurance. When an entire village is affected by a flood or drought, transfers from family members living elsewhere serve as insurance for smoothing the household's consumption.

Paxson (1993), using data from Thailand, investigated whether seasonal variations in incomes, as opposed to variations in preferences or prices, determine seasonal consumption patterns. It is generally assumed that the consumption patterns of poor rural households, with restricted access to credit, follow the pattern of seasonal incomes, implying that these households are unable to smooth consumption levels across seasons. However, Paxson suggests that there may be reasons, apart from borrowing constraints that may cause this seasonality in consumption. First, taste variations due to festivals, holidays and weather

patterns may be an important determinant of seasonal consumption. Second, seasonal price variation may also cause fluctuation in consumption. The results of her study suggest that seasonal variations in consumption are not clearly or consistently related to the timing of income receipts. Her findings suggest that, seasonal consumption patterns are due to the seasonal variation in prices or preferences, common to all households and not due to an inability of the household to dis-save or use savings to smooth consumption.

Canning (1999) estimated production functions using human assets and physical infrastructure as factors of production, with data covering 57 countries. Empirical results from this study suggest that the development of physical infrastructure will raise long-term production and income levels by externalities, thus making a large contribution to the reduction of chronic poverty.

Jimenez (1995) demonstrated that improvement to irrigation, paved roads, or an increase in the density of regional roads, had a direct impact on poverty reduction by generating an increase in agricultural productivity, the highest impact coming from irrigation development. Lipton and Ravallion (1995) suggested that infrastructure development increases the mobility of information, goods and services and employment, thereby indirectly helping to reduce chronic poverty. Sen (1981) suggests that improved access to infrastructure increases access to markets, including non-farm labor markets; reduces the cost of exchange or sale of goods and services; and raises farm and non farm incomes. Thus infrastructure development, both directly and indirectly, raises the welfare standards of the poor and reduces chronic poverty by increasing agricultural production, raising non-farm incomes, bringing smooth transition to the market economy, and reducing the transaction costs of accessing education and medical services. Datt and Ravallion (1997) show that agricultural productivity and rural poverty in India has moved together, and that irrigation and other infrastructure development have played an important role. States with better initial stock of human resources and physical infrastructure and irrigation intensity achieved higher growth in agricultural productivity, which in turn helped to reduce rural poverty.

Infrastructure development also helps to reduce transient poverty through preventing or reducing the risks of natural disasters. It also reduces transaction costs of marketing goods and services, and increasing non-farm employment opportunities, thereby, reducing transient poverty. Risk sharing and mutual insurance strategies adopted by the transient poor could be complemented by the development of infrastructure that aims to integrate markets by increasing the

mobility of goods, services and information, and promote consumption smoothing.

A study by IFPRI (Fan, Hazell and Thorat, 1999) analyzes the linkages between government spending, growth and poverty in rural India, using state level data from 1970 to 1993. The results of the study show that government spending on productivity enhancing investments, such as irrigation, research and development in agriculture, rural infrastructure (including roads and electricity), and rural development and welfare programs which target the rural poor directly have all contributed to reduction of rural poverty. Most of these investments have also contributed to growth in agricultural productivity, but their impacts on poverty and productivity show large variations. For example, expenditure on roads has the largest impact on both poverty reduction and productivity growth. Targeted spending on welfare for scheduled castes, tribes and other backward classes has been very effective and has had a large impact on rural poverty reduction, but it has had a negligible impact on productivity. On the other hand, expenditure on health reduced rural poverty significantly, but had little impact on productivity. Government spending on agricultural research and extension has had the largest impact on agricultural productivity growth, and it has also led to large benefits for the rural poor. Additional investments in irrigation had the third largest impact on growth in agricultural productivity, but a smaller impact on rural poverty (it should be noted here that the impact is determined based on marginal returns of each additional unit of investment, over and above the past investment in irrigation development), while the study acknowledges that irrigation development played a large role in production growth during the Green Revolution. The study appears to have some methodological problems in quantifying the impacts of various investments).

Chapter III Economy, Agriculture and Poverty in Sri Lanka An Overview of Key Developments and Trends

3.1 Characteristics of Sri Lankan Economy

Sri Lanka's economy was largely based on agriculture during the early 1950's and 1960's. Agriculture contributed between 60 and 70 percent to the GDP⁸, with agricultural export comprising mainly plantation crops such as Tea, Rubber, Coconut and Spices, accounting for over 70 percent of the income generated by agricultural sector. Much of the labor force (over 60 percent) was employed in the agriculture sector. More importantly, the bulk of foreign exchange earnings (over 70 percent) were earned from agricultural export. With very little industrial development, almost all consumption goods and more than 60 percent of domestic rice requirement were met with imports. Thus, the economy was largely trade dependent, with a highly productive plantation in the hands of large foreign companies co-existing with an inefficient local group that is based on irrigated and rainfed rice cultivation and underutilized labor force, providing only subsistence level income to farmers.

During the 1970's and 1980's, the contribution of the agriculture sector to GDP declined steadily, while that of other sectors increased. In the last two decades, the economy has undergone further transformation from agriculture to a predominantly services based economy, with a slight increase in the level of industrialization. The contribution made to the GDP by agriculture declined from 30 percent to 20 percent over the last two decades. The share of the industrial sector remained stagnant at around 17 to 18 percent, while that of the service sector increased from 44 to 55 percent and that of the construction sector from 4 to 7 percent. Although the labor force in the agriculture sector declined marginally, this sector still retained the bulk of the labor force. Over the last two decades a phenomenal increase in foreign employment has also been witnessed, particularly in the Middle Eastern countries, thus the high level of under employment observed in the rural sector has been somewhat eased.

In 1990, agricultural exports made up 36 percent of total exports, industrial exports accounted for 53 percent. In the year 2000, the value of industrial exports has increased to 78 percent of the total compared to 18 percent for agricultural

⁸ Central Bank Reports for various years.

exports. The highest amount of foreign exchange earnings is from the export of garments and textiles (50 percent of total value of exports), followed by earnings from private transfers (20 percent) from foreign employment. Agricultural exports, which provided the largest source of foreign exchange prior to the 1970's, is now the third largest source of foreign exchange (18 percent of total earnings), with tea exports providing 12 percent of total earnings. Thus, we can observe a gradual decline in importance of the role of the agricultural export sector in the Sri Lankan economy. At the same time, industrial exports, particularly garments and private transfers from foreign employment have substantially increased their contribution to the economy. The domestic agricultural sector, comprising paddy and other crops, has slightly increased its share in GDP over the last two decades. However, incomes from paddy farming have remained stagnant or have declined in real terms. Contribution to the GDP of other crops has also increased marginally, and farming of other crops generates incomes higher than farming of paddy.

Although Sri Lanka was the first South Asian country to adopt liberal open market policies two decades ago, it lags behind in development when compared with several other Asian countries that adopted these policies much later. This is due to various internal as well as external factors². Various political parties have supported reforms despite their political differences. Consequently, the direction of the policy changes has remained unaltered. The overall results of these reforms in terms of macroeconomic indicators have been positive, although the implementation has been slow or ineffective. Several reasons have been put forward to explain the slow or ineffective implementation of these reforms and the declining rate of growth. These include internal factors, such as ethnic and political conflicts, the diversion of large amounts of financial resources for the war effort aimed at resolving the ethnic conflict; and external factors such as sharp increases in the price of imports, low export prices, rapid increase in energy costs, inflation, and labor unrest. Several issues require the immediate attention of policy makers in order to shore up the economy. These include the problems of inadequate investment and saving levels, high rates of inflation, unemployment and poverty, high crime rate, stagnant agricultural productivity, inadequate demand for industrial goods and other serious macroeconomic imbalances. Some of these problems have further deteriorated in recent years, posing greater risks of marginalization when compared to the outside world.

² Central Bank Report, 2000.

3.2 Characteristics of Agriculture in Sri Lanka – Rainfed and Irrigated

About 30 percent of Sri Lanka's total land cover of 6.3 million ha (excluding area under inland waters) is under permanent cultivation and a further 16 percent under shifting or "Chena"³ cultivation. Thus, about 3.0 million ha, or nearly 50 percent of Sri Lanka's land surface is under some form of agricultural enterprise, of which 1.8 million ha is under permanent cultivation and 1.0 million ha under Chena cultivation. About a third of the area under permanent cultivation, or 0.6 million ha has been provided with irrigation facilities and is mainly cultivated with paddy. The total extent of land under paddy cultivation is estimated at 0.9 million ha, over 70 percent of which has irrigation facilities, while the rest is rainfed. Of the land with irrigation facilities two thirds, or 0.43 million ha, is under major irrigation schemes and the balance 0.23 million ha under minor irrigation schemes. The Mahaweli irrigation system provides irrigation facilities to almost 0.1 million ha of land under major schemes. The three main plantation crops of Tea, Rubber, and Coconut and other minor export crops occupy 0.8 million ha of rainfed land, mainly in the wet zone of Sri Lanka. Other permanent highland or annual crops occupy 0.2 million ha. The rest of the land area comprises forest, grassland and non-agricultural land (buildings, homes, rock outcrop, etc.). Details of land use are given in Table 3.1.

Table 3.1. Land Use in Sri Lanka

Land Use Category	Area in Million Ha	Percentage of Total	Area Irrigated in Million Ha
Total Area	6.57	100	
Inland waters	0.29	4.4	
Buildings, Non-agricultural land, and Homes	0.80	12.2	
Tea	0.18	2.7	0
Rubber	0.16	2.4	0
Coconut	0.44	6.7	0
Paddy	0.90	13.7	0.58
Chena lands	1.00	15.2	0
Other permanent / annual crops	0.20	3.0	0.02
Forest cover	2.10	32.0	
Grassland and shrub	0.50	7.6	

Sources: Statistical Abstract 2000, Census and Statistics Dept., Central Bank Reports, Mahaweli Authority Reports.

³ Chena – Slash and burn agriculture, where forests are cleared and cultivated for one to two years and then allowed to regenerate. The cycle, which usually lasted 10-15 years earlier, has been reduced to 3-5 years due to unavailability of land and due to restrictions on Chena cultivation and the reduction in forest cover.

The bulk (97 percent) of irrigated land is cultivated with paddy, and the rest with other permanent and semi permanent crops or seasonal crops such as, chillies, onions, pulses, yams, groundnut, potato, maize and other grains, sugarcane, vegetables, coconut, papaya, banana, melon and other fruits. The rainfed area can be categorized into Chena lands and other permanent highlands or lowlands. Due to restrictions imposed on Chena cultivation, by legal and other means, the area under Chena cultivation has not increased in recent years. The existing Chena areas are now being re-used, with a shorter interval for recovery. It is likely that in the future, Chena lands will be converted to permanent rainfed farms. Other permanent highlands and lowlands under rainfed cropping can again, be classified into lands in the wet zone and lands in the dry zone. In the dry zone, permanent rainfed farming is restricted by seasonality of rainfall. A successful cultivation is possible only in the wet season. In the dry season, the rainfall is much less and is insufficient for a complete and successful cultivation, unless supplementary sources of water are available. Thus, rainfed farming in the dry zone is mostly restricted to seasonal crops in uplands and permanent crops, particularly fruit crops such as bananas, papaya, citrus, mango, pomegranate, coconut and timber trees. Permanent crops are usually grown in home gardens and rarely in highland plots outside of home gardens. Crops grown in home gardens do receive some supplementary irrigation from wells, or from adjacent streams and canals. Seasonal crops are also grown in home gardens as well as in highland plots outside of home gardens. But more often seasonal crops, including paddy, are grown during the rainy or Maha⁴ season in the highlands. If paddy is not cultivated in the dry or Yala⁵ season, due to lack of water, a few drought tolerant annual crops may be grown on paddy fields to make use of the left over moisture in the paddy fields, supplemented by whatever rain that may fall during this season.

In the wet zone, the rainfall pattern is bi-modal, with high intensity rainfall occurring during both the Maha and Yala seasons. Thus the climatic pattern is ideally suited for permanent or seasonal rainfed farming. This region has specialized in export oriented plantation agriculture, with the bulk of the area covered by the three major crops of Tea, Rubber and Coconut. Rice is grown in valley bottoms and on terraced fields in hilly slopes. Some paddy is irrigated

⁴ Maha is the rainy cultivation season in Sri Lanka, which receives rainfall mainly from the North East Monsoon and lasts from October to March (The monsoon proper is from December to February and the inter monsoonal period from March to April)

⁵ Yala season is the dry cultivation season, which receives rainfall mainly from the South West Monsoon and lasts from April to September. (The monsoon proper is from May to September and the inter monsoonal period from October to November)

using the run of the river irrigation systems, but much of the paddy is rainfed. Other crops grown in this region include vegetables, potatoes, fruit and spice crops, tobacco, timber and medicinal plants.

Irrigated farming has been practiced for centuries in Sri Lanka and dates back more than two thousand years. The ancient kings, who had developed highly advanced irrigation technological skills, constructed large numbers of irrigation systems to cultivate rice. In fact, ancient Sri Lanka was once known as the rice bowl of Asia, and was famed for its exports of rice to many parts of the world. These irrigation systems usually consisted of a reservoir to store and regulate water, and a canal system to convey water for irrigation in both seasons. In some cases, the system comprised of a large reservoir that served as both storage and regulating facility connected via a well-developed canal system to many small reservoirs for the irrigation of fields commanded by these small reservoirs. Under this system, the large storage reservoir did not usually irrigate fields directly. The Yoda Wewa irrigation scheme in the North West coastal area of Mannar in the Northern Province is an example of such a system that is currently operational. Similarly, structures that have survived up to the present include very long canals (some more than 50 miles long), with gradients of one inch to a mile. It is noteworthy that such feats of irrigation engineering have not been emulated even with present day technology.

After thousands of years of use, around 12th Century BC, the highly developed hydraulic civilization started to disintegrate, many of these systems went into disrepair, and farmers abandoned these schemes and moved south. Several theories exist as to the reasons for the apparent decay of the hydraulic civilization that prevailed during this period. These include war between the local kings and invading forces from South India, loss of experienced water management personnel due to war, soil impoverishment, climatic change, famine and diseases such as Malaria, and attraction towards the wetter areas of the country.

Modern irrigation began in the last century during which period a large number of these ancient systems were restored by the British Colonial rulers, and are operational at present. Restoration of these ancient systems continued even after independence by the Government of Sri Lanka. A concerted effort was made to develop the water resources of the country, including the restoration of the ancient schemes, as well the construction of new ones. Major river basin development initiated in the 1950's and includes the Gal Oya, followed by Uda Walawe, Rajangane, and culminated in the Mahaweli program, which aimed to

develop the largest river basin in Sri Lanka. One of the objectives of developing these irrigation systems was to resettle the population from the land scarce Wet Zone⁶ to the sparsely populated Dry Zone⁷ of the country. Irrigated area increased from about 200,000 ha in 1950 to about 400,000 ha in 1970, and 500,000 ha in 1990 to about 650,000 ha in the year 2000. Over eighty percent of the irrigated land lies in the Dry Zone.

As in ancient times the bulk of the irrigated area is cultivated with rice. A small proportion of the irrigated command areas are cultivated with high value crops such as chillies, onions, pulses, sugar cane, tobacco, fruits and vegetables. The irrigated area can be categorized by the size of the irrigation system into areas irrigated by major schemes and areas irrigated by minor schemes. All schemes with a command area of less than 80 hectares are considered to be minor schemes. It is estimated that the area currently irrigated by major schemes, including Mahaweli schemes, is over 400,000 ha and that by minor schemes over 200,000 ha. The minor schemes are under the administration of the Department of Agrarian Services and operated by farmers. Typically, minor schemes impound run-off from local catchments, using earth dams, to provide supplementary irrigation for a full Maha crop and restricted Yala cultivation. The Mahaweli Authority is responsible for 100,000 ha of irrigated lands under major schemes, while the Irrigation Department is responsible for the balance 300,000 ha, of lands under major schemes. The Irrigation Department, further classifies the schemes under its control into medium schemes (command area between 80 ha and 400 ha) and major schemes (command area above 400 ha). The management of most major schemes is in the process of being transferred to the farmers. Major schemes provide sufficient water for a full Maha crop and a full or partial Yala crop. Average cropping intensity in major schemes is about 165 percent per annum and in the minor schemes, about 120 percent. The majority of the irrigation systems in the Wet Zone divert water from perennial streams or rivers using anicuts (weirs) for irrigation. Anicut schemes are also found in a few major

6 The Wet Zone is classified as areas receiving more than 2500 mm of rainfall per annum at 75 percent expectancy of annual rainfall. The Wet Zone comprises the following districts: Colombo, Gampaha, Kalutara, Kandy, Nuwara-Eliya, Galle, Matara, Ratnapura and Kegalle (About 20% of the land area and 9 of the 25 districts fall within the Wet Zone)

7 The Dry Zone is classified as areas receiving less than 2500 mm of rainfall per annum at 75 percent expectancy of annual rainfall. Within the Dry Zone is included the Intermediate Zone with mean annual rainfall between 1900-2500mm. The Dry Zone included the following districts, Jaffna, Mannar, Vavuniya, Mullaitivu, Batticaloa, Amparai, Trincomalee, Puttalam, Chilaw, Anuradhapura, Polonnaruwa, Hambantota, Moneragala, Badulla, Matale and Kurunegala. Parts of the latter three districts fall within the Intermediate Zone. (About 80% of the land area and 16 of the 25 districts fall within the Dry Zone)

Dry Zone perennial river systems.

3.3 Labor Force in Agriculture

The total employed labor force, which was 2.9 million in 1953, increased to 3.4 million in 1963, 4.5 million in 1971, 5.0 million in 1981, 6.0 million in 1990 and to 6.9 million in the year 2000⁸. Unemployment rate, which was 16.6 percent in 1963, rose to 18.7 percent in 1971, and declined marginally to 17.9 percent in 1981. Since then, the rate of unemployment has declined, to 15.8 percent in 1990, and reached to its lowest rate of 7.7 percent in the year 2000. The labor force participation rate has increased from 37 percent of the total household population (population aged 10 years and above) in 1953 to 50 percent in 1990 and has remained at this level over the last ten-year period. The above shows that, over the last five decades or so, the labor participation rate has improved considerably, while unemployment rate has also fallen drastically.

The share of agriculture in total employment, which was 53 percent in 1953, declined to 45 percent in 1981 and reached its lowest level of 36 percent of total employment in the year 2000, with the total number employed in this sector (agriculture, hunting, forestry, and fisheries) remaining at around 2.3 million. While the total number employed in agriculture has remained more or less static, the absolute number employed in industry has doubled, while that in the services sector has increased by over 50 percent, since the 1980's. The share of the labor force employed in industry rose from 10 percent in 1981 to 16.5 percent in the year 2000. The share of the labor force employed in the services and construction sectors rose from 40.1 percent and 3 percent to 41.3 percent and 5.5 percent respectively (Central Bank Report, 2000), over the same period. This indicates that a structural transformation of the economy has been taking place, with a gradual transfer of the agricultural labor force to other sectors.

Census data for 1981 (latest available) shows that, 25 percent (about 1 million persons) of those employed were farmers or cultivators, and about 18 percent (0.75 million persons) were agricultural or animal husbandry workers. A further 2.5 percent (0.1 million persons) were in other employment within agriculture. The share of employment in paddy cultivation in total employment in

⁸ Data on labor force, participation rate, employment and unemployment rates by sector were obtained from the four Censuses of Population conducted in 1953, 1963, 1971 and 1981 and from quarterly labor force surveys conducted by the Census and Statistics Department, from 1990 onwards.

agriculture was 24 percent in 1953. This share increased to 37 percent in 1963, 44 percent in 1971 and declined slightly to 42 percent in 1981. Thus paddy cultivation was a major source of employment within the agriculture sector in the 1980's. Although the share of agriculture in total employment has declined to 36 percent in the year 2000, it is likely that paddy cultivation still provides a major share of the employment within this sector.

3.4 Poverty in Sri Lanka

Although much work has been done to conceptualize, define and measure poverty, there is no official definition of poverty or a designated poverty line in Sri Lanka. Conclusions made in various studies undertaken on poverty in Sri Lanka are not strictly comparable, since different definitions of poverty have been used in determining the poverty line. The Department of Census and Statistics and the Central Bank are the two main sources of data for poverty analysis. Data from periodic Censuses, Socio-economic and Labor Force Surveys, Annual Food Balance Sheets, and Household Income and Expenditure Surveys, of the Census and Statistics Department and Annual Reports, and Consumer Finances and Socio-economic Surveys of the Central Bank provide the basis for inter-temporal analysis of poverty. A generally accepted conclusion of studies based on such data is that about 25 percent of the population lives in poverty, and that abject poverty or destitution does exist in Sri Lanka, but in small pockets.

Poverty in general terms can be defined as inability to maintain a minimal standard of living. Others⁹ have defined the poor as "those who do not have adequate resources to meet their basic needs". Researchers in Sri Lanka have used household income/expenditure as well as dietary intake data to determine poverty lines. Consumption poverty has been defined as those consuming less than a recommended minimal daily dietary intake of calories. In Sri Lanka, most studies have been based either on consumption poverty, or consumption poverty adjusted for basic non-food expenditure, but excluding consumer durable goods. Poverty, defined using household income/expenditure is more complicated as the values have to be adjusted for inflation in order to be comparable over time.

Some general characteristics of the poor can be derived from different studies on poverty undertaken in Sri Lanka. For example, poor households are

⁹ Theoretical basis developed by Harberger (1978; 1983) and Scandizzo and Knudsen (1980). The problem here is to identify core basic versus non-basic consumption goods. The basket comprising basic goods may vary in different communities, countries or over time.

larger in size and have a high dependency ratio. They have limited access to outside resources and little or no productive assets. There is the higher incidence of female-headed households among the poor. Members of poor households have lower levels of educational attainment and a greater proportion of unskilled labor. The level of underemployment, seasonal employment and unemployment is higher among the poor. There is no relationship between poverty and ethnicity and the type of occupation. The poor can be found among many occupations, including semi-subsistence farmers, low income market oriented farmers, self-employed individuals, urban workers and self employed in tradable and non-tradable sectors (Tudawe, 2000)

The population of Sri Lanka is largely rural with about 85.3 percent¹⁰ living in rural areas (80 percent in rural villages, 5.3 percent in estates in the plantation sector) (World Bank, Recapturing Missed Opportunities, 2000). Thus poverty is largely a rural phenomenon (those in the estate sector are also considered as rural). As there is no official definition of a poverty line in Sri Lanka, different researchers have used different reference values in estimating poverty. The following Tables 3.2, 3.3, and 3.4 provide a measure of poverty in three sectors, estimated by different researchers using various reference poverty lines (Gunetilleke, 2000)

Table 3.2. Incidence, Depth and Severity of Poverty in Sri Lanka by Sector: 1985/86, 1990/91, and 1995/96 – Reference Poverty Line

Sector	Reference Poverty Line : Rs 792 per person per month at 1995/1996 prices								
	1985/1986			1990/1991			1995/1996		
	IOP	DOP	SOP	IOP	DOP	SOP	IOP	DOP	SOP
Urban	18.4	4.4	1.6	15.0	3.4	1.2	14.7	3.0	0.9
Rural	35.6	8.9	3.2	22.0	4.5	1.4	27.1	5.8	1.9
Estate	20.5	3.9	1.3	12.4	2.1	0.6	24.9	4.9	1.6
Sri Lanka	30.9	7.6	2.8	19.9	4.1	1.3	25.2	5.4	1.7

Source: Department of Census and Statistics; and World Bank Sri Lanka Poverty Assessment 1995 (as reported in Gunetilleke, 2000).

IOP - Incidence of Poverty (Head Count), DOP – Depth of Poverty (Poverty Gap), SOP – Severity of Poverty (Squared Poverty Gap) .

Table 3.2, which shows the poverty level using a lower reference poverty line, indicates that the incidence, depth and severity of poverty are high in rural areas. Poverty in rural villages and estates declined between 1986 and 1991, and

¹⁰ Source: Extract from report of Census of Sri Lanka, 2001, Department of Census and Statistics.

increased between 1991 and 1996. Poverty in urban areas has declined continually between 1985 and 1996. For the whole of Sri Lanka, poverty declined up to 1990 and then increased substantially in 1996, but was still below the level of 1986.

Table 3.3. Incidence, Depth and Severity of Poverty in Sri Lanka by Sector: 1985/86, 1990/91, and 1995/96 – Higher Poverty Line

Sector	Higher Poverty Line : Rs 950 per person per month at 1995/1996 prices								
	1985/1986			1990/1991			1995/1996		
	IOP	DOP	SOP	IOP	DOP	SOP	IOP	DOP	SOP
Urban	28.1	7.5	2.9	24.5	6.1	2.2	24.9	5.8	2.0
Rural	50.2	14.6	5.9	36.0	8.6	3.0	41.3	10.5	3.8
Estate	20.5	3.9	1.3	12.4	2.1	0.6	24.9	10.1	3.3
Sri Lanka	44.5	12.6	5.0	33.0	7.8	2.7	39.2	9.9	3.5

Source: Department of Census and Statistics; and World Bank Sri Lanka Poverty Assessment 1995 (as reported in Gunetilleke, 2000).

IOP - Incidence of Poverty (Head Count), DOP – Depth of Poverty (Poverty Gap), SOP – Severity of Poverty (Squared Poverty Gap)

Table 3.3, which uses a higher poverty line, indicates a similar trend as the lower reference poverty line, in case of all sectors. The magnitude of poverty is obviously higher because of the high poverty line. Urban poverty shows decline between 1986 and 1990 and a marginal rise in 1996. In the estate sector, poverty declines substantially and between 1986 and 1991, but increases above the 1986 level in 1996. The increase in poverty in rural areas between 1991 and 1996 is attributed to the drought that prevailed during this period (World Bank, 2000).

**Table 3.4. Incidence, Depth and Severity of Poverty in Sri Lanka by Sector:
1996/97 – By Reference Poverty Line**

Sector	Reference Poverty Line at 1996/97 prices					
	Rs 1032 per person per month			Rs 860 per person per month		
	IOP	DOP	SOP	IOP	DOP	SOP
Urban	17.3	4.1	1.5	10.9	2.2	0.7
Rural	33.3	8.8	2.8	20.3	4.3	1.4
Estate	33.7	6.5	1.8	17.5	2.6	0.7
Sri Lanka	31.2	7.4	2.6	18.9	3.9	1.3
	Contribution to Poverty (Percent)					
	IOP	DOP	SOP	IOP	DOP	SOP
Urban	7.2	7.2	7.3	7.5	7.2	7.5
Rural	86.8	87.9	88.8	87.4	89.0	89.6
Estate	6.0	4.9	3.9	5.2	3.8	2.9
Sri Lanka	100.0	100.0	100.0	100.0	100.0	100.0

Primary Source: Consumer Finances & Socio-economic Survey 1996/97 Central Bank of Sri Lanka.
Secondary Source: Framework for Poverty Reduction in Sri Lanka Draft, Jan. 2000, Department of External Resources, Sri Lanka. IOP - Incidence of Poverty (Head Count), DOP – Depth of Poverty (Poverty Gap), SOP – Severity of Poverty (Squared Poverty Gap)

Table 3.4 provides poverty estimates for 1996/97, using data from the Consumer Finances & Socio-economic Survey 1996/97 of the Central Bank. Although not strictly comparable to the earlier data, all sectors show a reduction in poverty when compared to the 1995/96 data at the lower poverty line, with the estate sector showing the greatest improvement. When both 1995/96 and 1996/97 values are compared at the higher poverty line, both urban and rural poverty appeared to have declined, but estate sector poverty had increased substantially. This result is probably due to the large number of non-poor households clustered slightly above the poverty line, sensitive to economic fluctuations such as prices, droughts etc. particularly in the estate sector, which is vulnerable to external factors and natural conditions such as climate and rainfall. For Sri Lanka as a whole, poverty declined both at the lower and higher poverty lines. Thus we can observe a cyclic pattern of decline, increase and decline in poverty for Sri Lanka as a whole. The current declining trend in poverty in Sri Lanka is continuing after 1997.

Income poverty is high in Sri Lanka, with as much as 25 percent of the population below the poverty line (excluding the North and East, where poverty may have worsened because of the conflict). Poverty is high in rural areas, which has 85 percent of the population and 85 percent of the poor. The declining trend in

poverty is probably the result of structural changes and opening of the economy, which has sustained a reasonably high rate of economic growth over the last 15 years. However, there is still a large proportion of the population, who remain susceptible and vulnerable to economic changes and income fluctuations because they are clustered at the borderline of the poverty line. Poverty levels are particularly high among landless laborers, and among casual laborers employed in agriculture, mining, construction and the informal sector. Greater vulnerability and insecurity of the poor and those clustered above the poverty line, may be due to poor targeting of poverty alleviation programs, large increases in temporary and casual employment, and insufficient attention to risk management in agriculture.

There is evidence to suggest that high agricultural growth can reduce poverty significantly, since a large proportion of the population lives in rural areas. The highest incidence of poverty was recorded (1995/96 data) among households deriving their income from agriculture. Thus, slow per capita growth in agriculture (only 1 percent during 1990-96), major droughts, contraction in the paddy sector; slow growth in rubber and mining sub-sectors may have contributed to the high poverty levels in these sectors. Another factor that may be contributing to the high level of poverty in rural areas is lack of or inadequacy of infrastructure facilities. For example electricity reaches only 55-60 percent of the population, rural-urban road linkages are weak, transport facilities are poor and road networks are not maintained and of poor quality. Distortions in land and labor markets have reduced mobility, and created a large number of low quality, casual and temporary employment contributing to the perpetuation of poverty

A World Bank Report (1990), which analyzed the links between poverty and unemployment in Sri Lanka, suggests that, there is no conclusive evidence of poverty being related to unemployment, although many believe that unemployment may be a major cause of poverty. Such views have been reinforced by nutrition studies carried out in 1987, which showed that over 25 percent of pre-school children were malnourished and 20 percent of all babies delivered were of low birth weight due to maternal malnutrition. Most of the poor are found in households with a large number of dependents, with a high share of children and pregnant mothers among the poor. The World Bank report argues that unemployment may not be the main cause of poverty since as much as 75 percent of the unemployed came from non-poor households and less than ten percent of the poor were unemployed. The report further states that half of the unemployed are well-educated women, who are being supported by their parents while awaiting high-paying jobs in the formal sector. A subsequent World Bank study on

poverty (Recapturing Missed Opportunities, 2000) has not dealt specifically with the relationship between poverty and unemployment, but suggests that poverty levels are high among casually employed persons in agriculture, mining, and construction sectors. The report also indicates that there is evidence to suggest that fluctuation in economic performance leads to large increases in poverty.

Sri Lanka has been committed to a well-established social welfare program, providing free health and educational services, since the early 1900s. Public expenditures in health and education grew to 6 percent of the GDP in 1948-52 and remained at this level up to the 1970s (World Bank, 1990). As a result of improved health care and education, mortality rates declined rapidly and population increased at rates close to 3 percent, resulting in a large population increase in the 1950s. However, improved education and other social welfare programs began to have an opposite impact on population growth rates, which started to decline by the early 1980s and has been declining ever since. Apart from education and health services, the Government introduced a food subsidy program to reduce the impacts of World War II. This program, which was initiated in the 1940s and continued up to 1977, provided a fixed amount of rice and wheat flour at a subsidized price to all households in Sri Lanka (World Bank 1990).

With the opening up of the economy in 1977, an attempt was made by the government to target food subsidy programs to the actual poor and needy population. In 1978, the food subsidy program was restructured and redirected to the poorest of the population. Consequently, food subsidies were issued only to households with a monthly income of Rs 300 or less for five or more persons. The number of people receiving food subsidies was halved as a result. Toward the end of 1979, food subsidies in the form of a rationed quantity of food was eliminated and replaced by a food stamp program (FSP), for those earning below Rs 300 per month. An evaluation of the FSP showed that only 38 percent of the total food stamp payments reached the intended poorest 20 percent of the population (World Bank, 1990). The remainder of the subsidy went to higher income groups. The FSP is undergoing restructuring to increase the proportion of the subsidy actually reaching the poor from 38 to 80 percent. This would eliminate about half of the number of current beneficiaries of the subsidy scheme.

The opening up of the economy provided an impetus to growth, and the economy grew at 6 percent per annum during the five-year period of 1978-82. However, growth slowed down to around 3 percent over the next seven-year period. Further structural reforms in the economy were needed to accelerate

growth. An economic reform program was instituted in 1989, whereby adjustment measures were introduced in order to institute a sustainable macroeconomic framework to accelerate growth, provide an enabling environment for private sector investment and employment. In the long-run, these reforms would facilitate greater participation of the poor in the economy and overall growth process, expand access to resources for economic activity and self employment, eliminate the biases against labor intensive enterprises and reduce unemployment. Some of the reform measures introduced, such as the removal of subsidies, restoration of macroeconomic imbalances, and exchange rate re-adjustment, would adversely affect the poor in the short-run. It was estimated that the overall consumption levels of the poorest 20 percent of the population would fall by 20 percent or more by the removal of subsidies on wheat flour, rice, bus fares, and sugar, and the devaluation of the rupee (World Bank, 1990). To address this problem, the government decided to set aside 3.0 – 3.5 percent of the GDP every year for programs to increase the living standards of the poorest 20 percent of the population.

The food subsidy program provided free or subsidized food to all households, but the first real attempt at poverty alleviation was the Janasaviya Program (JP) initiated by the Government in 1989. The program intended to transfer Rs 2500 per month to each poor household for a period of two years. In addition, JP included components for credit based entrepreneurial development, and free mid-day meals, uniforms, and textbooks for school children. An evaluation of the Janasaviya Program (World Bank, 1990) identified its many shortcomings. In addition to the program being too costly to be sustainable, the selection criteria were not defined precisely and the benefits not related to incomes, leading to inequities and the inclusion of non-poor within the program. The benefits were high compared to prevailing income levels, leading to disincentives to work. Poverty, being a long-term problem, cannot be resolved within the two-year limitation of the JP. There was no provision for the inclusion of families falling into poverty after the selection process was completed.

In addition to the JP, another program, the Mid Day Meal Program (MDMP) targeted towards children was started in 1989. A total of US\$ 50 million was spent annually in providing one meal a day to all children in primary and secondary schools under the Mid-Day Meal Program. This program failed because it was too costly to sustain and did not reach the group, which was nutritionally most at risk, i.e. the pre-school children. The Janasaviya Program was scrapped, after the formation of the new Government in 1994.

After the scrapping of the JP, a more ambitious poverty alleviation program “Samurdhi” program, was put into operation by the new government in 1995¹¹. This program, which is basically an income transfer program, provides direct cash grants to more than 2 million poor families (55 percent of the population). In addition to cash grants, several other subsidiary activities were being implemented through this program to alleviate poverty. These included community and infrastructure development projects, savings programs, banking and credit programs, social insurance programs, training and entrepreneur programs, and self-employment schemes. About 80 percent of the funds allocated to the program were utilized for income transfers, intended to provide as a consumption supplement. In this case, the amount of transfer was related to the income of the household and ranged from Rs 100 to Rs 1000 per month per family, depending on the household size. The other components of the program were intended to expand the productive asset base of the poor and to create employment and income through community infrastructure development (S. Kelegama, 2001).

Both the design and implementation of the Janasaviya and Samurdhi programs have been flawed and their effectiveness in creating opportunities or empowering the poor to overcome economic and social barriers minimized as a result (World Bank, 2000). The major reasons for their ineffectiveness according to the World Bank are:

- (1) Political bias of administrators/mobilizers of poverty programs, with party affiliation and voting patterns influencing the allocation of income

¹¹ Although the “Samurdhi” program was a targeted poverty alleviation program, many flaws in the procedures adopted in estimating income and eligibility, resulted in the targeted group not receiving adequate allocations. An assessment of the income of poor households is made by Government appointed officials (Samurdhi Development Officers). This assessment is made on the basis of a visit to the household and interview with household members, as well as an examination of any documentary evidence of income or lack of income. The Grama Niladhari’s (the lowest level government administrative official) assistance is also obtained in the certification and evaluation of household income. Families owning or cultivating irrigated land is not eligible for Samurdhi payments. Because of the paucity of evidence on income, particularly agricultural income and biases of officers evaluating income (Samurdhi Officers are mostly political appointees of the then Government in power), deserving cases are sometimes left out while those ineligible may be brought within the program. Furthermore, the actual amount of allocation also depends on the number in the household and amount of income earned per month. The maximum number of household members taken into account in the estimation include the parents and up to four children below 18 years of age. Although certain criteria for eligibility for Samurdhi payments have been established, these are often difficult to verify. A family of six earning less than (Rs 1000 ? or Rs 3000? per month) is eligible for Samurdhi payment. Consumption of home grown produce is not taken into account in estimating income. About 2 million households (55% of the population) were brought under the Samurdhi program, with each family receiving between Rs 100 to 1000 per month as grants, under the program.

- transfers, which made the poor vulnerable to changes in political climate;
- (2) Both programs covered up to 50 percent of the population, or twice the actual percentage living in poverty. The transfers from the poverty programs reached only between 55-65 percent of those in the lowest income groups. Poor targeting resulted in thin spread of income transfers, diverting funds away from the most needy.
 - (3) Central control of poverty programs has hindered the development of communal social capital, and collaborative social relations, reducing the participation of the poor in development.
 - (4) The costly poverty programs (up to 1 percent of GDP) have not created sufficient opportunities for the poor. Large expenditures on poorly targeted transfers, lack of sustained rural works programs, long-term administrative costs of hiring poverty workers (over 30,000 workers in the Samudhri Program), and weak exit mechanisms are some of the issues that have to be addressed.