Public Disclosure Authorized
Public Disclosure Authorized
Public Disclosure Authorized
Public Disclosure Authorized

Sri Lanka Post-Disaster Needs Assessment

Floods and Landslides-May 2016

Ministry of National Policies and Economic Affairs
Ministry of Disaster Management

September 2016

In colloaboration with

EUROPEAN UNION

THE WORLD BANK

Sri Lanka Post-Disaster Needs Assessment

ISBN 978-955-9417-57-6
© Ministry of Disaster Management
Vidya Mawatha, Colombo 07.
Tel : +94-112 665170
Fax : +94-112 665170

Content by :
Photographs :
Layout & Designing : Garvi Design Studio
Printed by Garvi Design Studio

Foreword

In the month of May 2016, parts of Sri Lanka were hit by the heaviest recorded rainfall in more than 18 years, which caused severe floods in 24 districts and also horrific landslides, one of which was the worst recorded in our country. The floods and landslides resulted in the loss of at least 93 lives and affected almost half a million people. The disaster damaged over 58,000 houses and caused a loss in income for over a million people dependent on agriculture, trade and industries. In the aftermath, extensive relief operations were conducted at national, provincial, district as well as divisional levels, significantly supported by the Sri Lanka Army, Navy and Air Force, civil society organisations, the private sector as well as individual contributions.

As we now move on from the immediate relief phase, the subsequent recovery phase has been initiated by a Post-Disaster Needs Assessment (PDNA). This PDNA used a methodology, which was developed jointly by the United Nations, the World Bank and the European Union. It has been applied after many large disasters worldwide and has become a standard mechanism by the international community to assess the damages and losses of the disaster and estimate the recovery needs.

The PDNA was conducted under the overall leadership of the Ministry for Disaster Management and the Ministry of National Policies and Economic Affairs. The line ministries undertook the assessment with the support of international and national experts from the United Nations, World Bank and the European Union. The PDNA team worked tirelessly to produce this report in a very short time frame. The process was participatory and included several rounds of consultations with all stakeholders and communities in the affected areas. Our sincere thanks are due to all who contributed to this report as well as to the United Nations, the World Bank and the European Union for the overall guidance.

The PDNA report covers nine sectors and four cross cutting themes and looks at the overall impact of the disaster. As a complement to the assessment of the effect and the impact of the floods and landslides this PDNA report also incorporates a recovery strategy. This strategy builds on the fact that Sri Lanka is prone to regular floods as well as on the uncertainty of global climate change and phenomena such as El Niño. Therefore, the recovery strategy proposes a long-term plan to strengthen preparedness and to reduce the risks of further disasters and extreme weather events.

The overall outcome we are aiming for is a safer Sri Lanka, where the lives of the Sri Lankan people are better protected from extreme events. In order to ensure this outcome we envisage continuous and inclusive consultations with the concerned urban and rural communities, particularly vulnerable groups, throughout the recovery process.

This PDNA is dedicated to the almost half a million Sri Lankans who were affected by this calamity. We look forward to working with all stakeholders in the implementation of the recovery programmes proposed in this PDNA report towards a resilient Sri Lanka.

Ministry of National Policies and Economic Affairs and
Ministry of Disaster Management

Acknowledgements

The PDNA for the floods and landslides was made possible due to the collaborative efforts of the Government of Sri Lanka with its partners, the United Nations agencies, the World Bank, the European Union and other organisations. The PDNA was led and conducted by the Ministry of Disaster Management and the Ministry of National Policies and Economic Affairs of the Government of Sri Lanka and line ministries with support from the partners. The Secretaries of the Ministry of Disaster Management and the Ministry of National Policies and Economic Affairs would like to extend special acknowledgment to the following Sri Lankan authorities:

Ministry of Agriculture, Ministry of City Planning and Water Supply, Ministry of Education, Ministry of Finance, Ministry of Fisheries and Aquatic Development, Ministry of Health, Nutrition & Indigenous Medicine, Ministry of Highways and Higher Education, Ministry of Housing and Construction, Ministry of Industry and Commerce, Ministry of Plantation Industries, Ministry of Power and Energy, Ministry of Provincial Councils and Local Government, Ministry of Rural Economic Affairs, Ministry of Sustainable Development and Wildlife, Ministry of Transport and Civil Aviation, Ministry of Women and Children's Affairs, Ministry of Hill Country New Villages, Infrastructure and Community Development, Central Bank of Sri Lanka, Central Environment Authority, Ceylon Electricity Board, Department of Agriculture, Department of Census and Statistics, Department of Agrarian Development, Department of Export Agriculture, Department of Meteorology, Disaster Management Centre, Hector Kobbekaduwa Agrarian Research and Training Institute, Irrigation Department, Kolonnawa Urban Council, National Building Research Organisation, National Disaster Relief Services Centre, Natural Resources Management Center, National Water Supply and Drainage Board, Sri Lanka Army, University of Sri Jayewardenapura, Waste Management Authority-Western Province, and Ceylon Chamber of Commerce.

The Secretaries of the Ministry of Disaster Management and of the Ministry of National Policies and Economic Affairs are grateful for technical input and support from the following partner organisations:

European Union, Food and Agriculture Organisation, International Labour Organisation, Sri Lanka Red Cross Society, UN-Habitat, United Nations Children's Fund, United Nations Development Programme, United Nations Office for Project Services, United Nations Population Fund, United Nations Volunteers, UN Women, World Bank Group, World Food Programme, World Health Organisation.

The Secretaries of the Ministry of Disaster Management and the Ministry of National Policies and Economic Affairs would like to express their gratitude:

To the members of the PDNA team
Rita Missal (UNDP), Chaminda Pathiraja (Ministry of Disaster Management), Soenke Ziesche (UNDP), Ricardo Zapata-Marti (EU), Visaka Punyawana Hidellage (UNDP), Buddika Hapuarachchi (UNDP), Sureka Perera (UNDP), Suranga Kahandawa (World Bank), Rukshan De Mel (UNDP), Sachi Perera (UNV), Senel Wanniarachchi (UNV), Cecilia Aipira (UN Women).

To the representatives of the partner organisations
Una McCauley (United Nations Resident and Humanitarian Coordinator and UNDP Resident Representative, Sri Lanka), Idah Z. Pswarayi-Riddihough (Country Director, World Bank Sri Lanka and the Maldives), David Daly (Head of the EU Delegation, Sri Lanka and the Maldives), Jorn Sorensen (UNDP Country Director, Sri Lanka), Peter Batchelor (UNDP Resident Representative a.i.) and Lovita Ramguttee (UNDP Deputy Country Director, Sri Lanka).

To the experts who peer reviewed the report.

To the members of the PDNA sector teams and their contributors who are listed in Annex 1. PDNA Sector Teams and Contributors.

Table of Contents

Foreword	3
Acknowledgements	5
Table of Contents	7
List of Tables	9
List of Figures	14
List of Abbreviations	15
Part 1: PDNA Assessment Report	**17**
Executive Summary	19
Sector Reports	40
Social Sectors	40
Housing, Land and Settlements	41
Health and Nutrition	59
Education	65
Sector Reports	76
Productive Sectors	76
Food Security, Agriculture, Livestock, Fisheries	77
Industry and Commerce	91
Sector Reports	101
Infrastructure Sectors	101
Irrigation	103
Water and Sanitation	111
Transport	124
Power Supply	135
Sector Reports	141
Cross Cutting Issues	141
Environment	142
Disaster Risk Reduction	156
Employment and Livelihoods	173
Gender and Social Inclusion	187
Assessment of Disaster Impact	199
Macro-economic Impact	200

Table of Contents

Human Development Impact	208
Part 2: Recovery Strategy	**223**
Annexes	237
Annex 1. PDNA Sector Teams and Contributors	238
Annex 2. Terms of Reference	242
Annex 3. District Breakdown of Damages and Losses191	248
Annex 4. District Breakdown of Recovery Needs192	256
Annex 5. Bibliography	264
Annex 6. International Response-Foreign Donations	268
Annex 7. Housing, Land and Settlements	273
Annex 8. Health Sector	276
Annex 9. Education	277
Annex 10. Industry and Commerce Sector	283
Annex 11. Irrigation Sector	290
Annex 12. Transport Sector	292
Annex 13. Power Supply Sector	293
Annex 14. Environment Sector	295
Annex 15. Disaster Risk Reduction	296
Annex 16. Employment and Livelihoods	299

List of Tables

Table 1. Affected people and houses by district. 20

Table 2. Affected people by landslides. 22

Table 3. MDM allocation for immediate relief. 23

Table 4. Costs of relief operations by Sri Lankan armed forces. 23

Table 6. Worst flood disasters in Sri Lanka in terms of affected people. 25

Table 5. Spatial Distribution of Poverty in Sri Lanka. 25

Table 7. Worst flood disasters in Sri Lanka in terms of damages. 26

Table 8. Worst landslide disasters in Sri Lanka. 26

Table 9. Floods and landslides 2016, total damages and losses. 29

Table 10. Damages and losses-percentages by sector from total. 30

Table 11. Damages and losses-breakdown between private and public sector. 31

Table 12. Floods and landslides 2016, total recovery needs. 35

Table 13. Sectors of the PDNA 2016 in Sri Lanka. 38

Table 14. Affected people in the six priority districts. 38

Table 16. Basis of classification of housing units. 42

Table 17. Housing, Land and Settlements damages and losses. 47

Table 18. Housing, Land and Settlements recovery and reconstruction needs. 54

Table 19. Housing rate (LKR). 56

Table 20. Asset per housing types and sizes (LKR). 56

Table 21. Basic health sector data. 60

Table 22. Selected health indicators. 60

Table 23. Number of admissions of suspected dengue patients. 62

Table 24. Health damages and losses. 62

Table 25. Recovery costs Ministry of Health. 64

Table 26. Recovery costs Sri Lanka Army Medical Service. 64

Table 27. Health recovery and reconstruction needs. 64

Table 28. Proportion of damaged schools by district. 68

Table 29. Estimation of damage to infrastructure and physical assets. 68

Table 30. District-wise estimation of damage to infrastructure and physical assets of government schools. 69

List of Tables

Table 31. Education damages and losses (LKR million). 70

Table 32. Education recovery and reconstruction needs. 71

Table 33. Recovery and reconstruction plan for the education sector including pre-schools 74

Table 34. Rice production summary statistics. 78

Table 35. Total fisheries production in Sri Lanka. 79

Table 36. Food balance sheets for major food commodities. 79

Table 37. Reported loss for paddy cultivation.

Table 38. Reported damages and losses for seasonal and export crops. 82

Table 39. Reported damages to the horticulture sector. 82

Table 40. Reported damages to the agricultural irrigation sector. 83

Table 41. Reported losses to the agriculture sector. 83

Table 42. Reported damages to the livestock sector. 84

Table 43. Reported damages to the fishing sector. Source: Department of Fisheries. 84

Table 44. Food Security, Agriculture, Livestock, Fisheries damages and losses. 85

Table 45. Food Security, Agriculture, Livestock, Fisheries recovery and reconstruction needs. 88

Table 46. Structure of Industry and Commerce. 92

Table 47. Enterprises in Industry and Commerce sectors by districts. 93

Table 48. SME classification in Sri Lanka. 93

Table 49. Total insurance claims up to August 15, 2016. 96

Table 50 Summary of damages and losses in the Inudstry and Commerce sector. 97

Table 51. Industry and commerce recovery and reconstruction needs. 99

Table 52. Irrigation sector damages. 106

Table 53. Irrigation recovery and reconstruction needs. 109

Table 54. Drinking water coverage in focal districts. 112

Table 55. Sanitation coverage in focal districts. 113

Table 56. Pipe borne water and dug well baseline data in focal districts. 113

Table 57. Household toilet baseline data in focal districts. 114

Table 58. Infrastructure Statistics used for Costing Damages, Losses and Needs. 117

Table 59. Water and Sanitation damages. 118

Table 60. Water and Sanitation losses. 118

List of Tables

Table 61. Water and Sanitation recovery and reconstruction strategies. 120

Table 62. Water and Sanitation recovery and reconstruction needs. 121

Table 63. Water and Sanitation implementation strategy for recovery and reconstruction. 122

Table 64. Sri Lanka: Transport Activity and Modal Split (2012). 125

Table 65. Locations and Nature of Flood Damages to Expressways. 127

Table 66. Locations and Nature of Flood Damages to Railways. 128

Table 67. Damages to National Roads. 129

Table 68. Damages to Provincial Roads. 130

Table 69. Revenue losses to SLTB. 130

Table 70. Damages and Losses to Sri Lanka Railway. 130

Table 71. Transport damages and losses. 130

Table 72. Transport recovery and reconstruction needs (all short term until end of 2016). 133

Table 73. Total electricity capacity. 135

Table 74. Power Supply damages and losses. 137

Table 75. Power Supply recovery and reconstruction needs. 139

Table 76. Ecological status and disaster impacts. 148

Table 77. Status of the landslides in Kandy and Kegalle districts. 150

Table 78. Ecosystem service losses at Aranayake landslide. 151

Table 79. Infrastructure damage occurred within the following areas under the jurisdiction of DWC. 151

Table 80. Loss of Revenue to Department of Wildlife Conservation from Tourism in the affected areas. 151

Table 81. Environment recovery and reconstruction needs. 153

Table 82. Percentage of annual allocation for DM against the total budget, 2013-2016. 159

Table 83. Emergency relief funds released by the NITF and Treasury. 164

Table 84. Damages to Flood Protection Structures. 166

Table 85. Losses to the DRR Sector-Government cost of relief operations. 167

Table 86. Losses to UN and NGOs from Humanitarian Response (14 May-30 June 2016). 167

Table 87. DRR damages and losses. 167

Table 88. DRR recovery and reconstruction needs. 171

Table 89. Economically Active Population. 173

Table 90. Economically Active/Inactive Population by Gender. 174

List of Tables

Table 91. Composition of Informal/Formal Sector Employment by Economic Sector. 174

Table 92. Distribution of Informal/Formal sector employment by employment status. 175

Table 93. Employment Status by Province-2014. 175

Table 94. Percentage Distribution of Employed Population by Major Industry Group for Each District. 177

Table 95. Distribution of informal sector employment across major industry groups in priority districts 179

Table 96 Number of people in informal sector employment affected by the disaster in priority districts. 179

Table 97. Distribution of affected persons in informal sector by Employment Status and District. 180

Table 98. Loss of employment of Informal Sector Employment by Employment Status and District 181

Table 99. Employed and Affected Population in Formal Sectors by Major Industry Group in Priority Districts-2014 (thousands of persons). 182

Table 100 Loss of income of formal Sector Employment by District (LKR thousand). 182

Table 101. Employment and Livelihoods recovery and reconstruction needs. 184

Table 102. Number of FHHs per District in Sri Lanka. Source: DMC/NDRSC. 188

Table 103. Sex-disaggregated data for disaster-affected population in six districts. 193

Table 104. Gender and Social Inclusion recovery needs. 197

Table 105. Damage and losses by sector and by private versus public sector in LKR million. 201

Table 106. Damage and losses by district in Industry and Commerce sector. 202

Table 107. Estimated impact of value added in industrial and sectors. 203

Table 108. Estimated impact on 2016 fiscal accounts of disaster, relief and repaid measures. 206

Table 109. Damages and losses by district-Overall total. 248

Table 110. Damages and losses by district-Housing, Land and Settlements Sector. 249

Table 111. Damages and losses by district-Health Sector. 250

Table 112. Damages and losses by district-Food Security, Agriculture, Livestock, Fisheries Sector. 251

Table 113. Damages and losses by district-Industry and Commerce Sector. 252

Table 114. Damages and losses by district-Irrigation Sector. 253

Table 115. Damages and losses by district-Water and Sanitation Sector. 254

Table 116. Damages and losses by district Transport Sector. 255

Table 117. Recovery Needs by district-Overall total. 257

Table 118. Recovery Needs by district-Housing, Land and Settlements Sector. 258

Table 119. Recovery Needs by district-Health Sector. 259

List of Tables

Table 120. Recovery Needs by district-Food Security, Agriculture, Livestock, Fisheries Sector. 260

Table 121. Recovery Needs by district-Irrigation Sector. 261

Table 122. Recovery Needs by district-Water and Sanitation Sector. 262

Table 123. Recovery Needs by district-Transport Sector. 263

Table 124. International Response-Foreign Donations. 272

Table 125. Damages-Ministry of Health, Medical Supplies Division, Sub Stores-Kotikawatte. 276

Table 126. Losses-Operational cost-Ministry of Health. 276

Table 127. Operational cost-Ministry of Defence. 276

Table 128. Detailed cost breakdown of the proposed MSD Sub Stores-Ministry of Health. 276

Table 129. Grade One New Admissions by Gender & with ECCE-2015. 277

Table 130. Government schools by functional grade-2015. 278

Table 131. Students-2015 (in Govt.Schools) 279

Table 132 Gross Domestic Product in 2015 by Industrial Origin at Constant (2010) princes. 283

Table 133 Enterprises in Industry and Trade sectors by districts. 284

Table 134. Summary of district-wise damages and losses in SMEs. 285

Table 135. Industry and Commerce informal sector damage and losses for most affected districts. 285

Table 136. Damages and losses in informal sector. 286

Table 137. Damages and losses in informal sector in Puttalam, Kegalle, Ratnapura and Anuradhapura districts. 287

Table 138. Industry and commerce insured damage and losses in LKR millions 289

Table 139. Flood Damage for Irrigation Infrastructures. 291

Table 140. District-wise recovery needs in detail for RDA roads. 292

Table 141. Infrastructure Damages to Electricity Sector in CEB areas, district-wise. 294

Table 142. Infrastructure Damages to Electricity Sector in LECO areas. 294

Table 143. Important Environmental legislations and authorities in charge of its implementation. 295

Table 144. Total humanitarian response (May 14-June 30, 2016) funded through UN CERF. 297

Table 145. International Federation of Red Cross and Red Crescent Societies Contribution. 298

Table 146. Employed population in priority districts. 299

Table 147. Employed population (thousands) by major industry group in priority districts-2014. 299

Table 148. District wise affected population. 300

List of Figures

Figure 1. Affected districts. Source: GIS Unit, Mitigation Research and Development Division DMC. 21

Figure 2. Summary of damages vs. losses. 27

Figure 3. Available district-wise distribution of damages and losses. 28

Figure 4. Effects by sector category. 30

Figure 5. Private vs. public effects. 31

Figure 6. Summary of short, medium and long-term recovery needs. 33

Figure 7. Available district wise recovery needs in the short, medium and long-term. 34

Figure 8. Recovery needs by sector category. 36

Figure 9. Effects and recovery needs by sector category. 37

Table 15. Definition of sector (urban, estate and rural). 42

Figure 10. Distribution of affected houses due to floods and landslides. 45

Figure 11. Crop calendar Sri Lanka. 78

Figure 13. Sector-wise insurance claims. 95

Figure 14. Forest cover of Sri Lanka. Source: Forestry Department. 144

Figure 15. Spatial distribution of high, medium and low polluting industries in Kelani River basin. 147

Figure 17. Total rainfall on 15 May 2016 (mm). Source: Department of Meteorology. 162

Figure 18. Distribution of employment by considering main job by major industry groups. 174

Figure 19. Percentage distribution of employed population in major industry groups by districts 2014. 176

Figure 20: Pre and post-disaster GDP growth rate projections. 201

Figure 21: Inflation (all items, food and non-food). 201

Figure 22. Disaster impact on projected 2016 GDP growth rate. 204

Figure 23. Sri Lanka May 2016 disaster compared to other disasters. 207

List of Abbreviations

ADB	Asian Development Bank
BBB	Building Back Better
BCP	Business Continuity Plan
CBO	Community Based Organisations
CBS	Central Bank of Sri Lanka
CEA	Central Environmental Authority
CEB	Ceylon Electricity Board
CERF	Central Emergency Response Fund
CHF	Swiss Franc
CRIP	Climate Resilient Improvement Project
DAD	Department of Agrarian Development
DAS	Department of Agrarian Services
DFID	Department for International Development
DOE	Department of Education
DMC	Disaster Management Centre
DNCWS	Department of National Community Water Supply
DPRD	Disaster Preparedness and Response Division
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DS	Divisional Secretary
DWC	Department of Wildlife Conservation
ECCD	Early Childhood Care and Development
ECE	Early Childhood Education
EOC	Emergency Operation Centre
EU	European Union
EWS	Early Warning System
FCD	Forest Conservation Department
FGD	Focus Group Discussion
FHH	Female-headed households
GBV	Gender-based violence
GCE	General Certificate Examination
GDP	Gross Domestic Product
GoSL	Government of Sri Lanka
HDI	Human Development Index
HIES	Household Income and Expenditure Survey
IASC	Inter-Agency Standing Committee
ID	Irrigation Department
IFRC	International Federation of Red Cross and Red Crescent Societies
INFORM	Index for Risk Management
IOM	International Organisation for Migration
JICA	Japan International Cooperation Agency
KII	Key Informant Interview
LECO	Lanka Electricity Company
LKR	Sri Lankan Rupee
MASL	Mahaweli Authority of Sri Lanka
MCCB	Molded Case Circuit Breakers
MDM	Ministry of Disaster Management

MIWRM	Ministry of Irrigation and Water Resources Management
MMDE	Ministry of Mahaweli Development and Environment
MNPEA	Ministry of National Policies & Economic Affairs
MoA	Ministry of Agriculture
MoE	Ministry of Education
MoH	Ministry of Health, Nutrition and Indigenous Medicine
MSD	Medical Supplies Division
MSW	Municipal Solid Waste
NBRO	National Building Research Organisation
NCCAS	National Climate Change Adaptation Strategy
NCCP	National Climate Change Policy
NNDIP	National Natural Disaster Insurance Policy
NDMCC	National Disaster Management Coordination Committee
NDRSC	National Disaster Relief Services Centre
NFI	Non-food item
NGO	Non-governmental organisation
NIID	National Institute for Infectious Diseases
NITF	National Insurance Trust Fund
NWS&DB	National Water Supply and Drainage Board
OFC	Other Field Crops
PDNA	Post-Disaster Needs Assessment
PHDT	Plantation Human Development Trust
PHI	Public Health Inspector
PHM	Public Health Midwife
PHSRC	Private Health Sector Regulatory Council
PID	Provincial Irrigation Departments
PLWD	People living with disabilities
PPP	Private power producers
PRDA	Provincial Road Development Authority
PRDD	Provincial Road Development Department
PTF	Presidential Task Force
RDA	Road Development Authority
RPC	Regional Plantation Companies
RWS	Rural Water Supply
SDGs	Sustainable Development Goals
SLLRDC	Sri Lanka Land Reclamation and Development Corporation
SLRCS	Sri Lanka Red Cross Society
SLR	Sri Lanka Railways
SLTB	Sri Lanka Transport Board
SME	Small and Medium-sized Enterprises
UDA	Urban Development Authority
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNOPS	United Nations Office for Project Services
WB	World Bank
WFP	World Food Programme
WHO	World Health Organisation
WSP	Water Safety Plan

Part 1: PDNA Assessment Report

Executive Summary

Disaster Event

From May 14, 2016 onwards a low-pressure zone above Sri Lanka caused torrential rainfall all over the country, and in some places it was the heaviest recorded rainfall in more than 18 years. Several rivers, including Kelani River, Kaluganga, Mahaweli River, Deduru Oya, Yan Oya, Maha Oya and Attanagalu Oya, observed rising water levels, which caused widespread flooding. Heavy rainfall was recorded in Deraniyagala (355.5 mm), Colombo (256 mm), Katunayake (262 mm), Ratmalana (190 mm), Mannar (185.5 mm) and Trincomalee (182.4 mm). Further, districts such as Kurunegala, Kegalle, Nuwara Eliya, Ratnapura, Kalutara, Kandy, Puttalam, Batticaloa and Anuradhapura also received more than 100 mm of rainfall. The resulting floods were the worst in 25 years. As another result of the rainfall, severe landslides occurred in several divisions in the Kegalle district. The worst landslide occured in the Aranayake division in the Kegalle district where three villages were completely swept away and buried under mud and debris.

The large extent of the flooding is partially linked to the El Niño phenomenon, which has affected the Asia and the Pacific region. Initially, Sri Lanka experienced lower than average rainfall (with prolonged water shortages and drought), which was then followed by sudden heavy rains and storms causing floods and landslides.[1]

According to the National Disaster Relief Services Centre (NDRSC), which is part of the Sri Lankan Ministry of Disaster Management (MDM), 24 districts out of a total of 25 districts countrywide were affected by the flooding and landslides. The floods and landslides affected approximately 493,319 people (124,398 families). 93 people died (36 women, 43 men, 10 children, 4 bodies could not be identified), 33 were injured and 117 are missing. The majority of the deaths (50, i.e. 54%) occurred due to the landslides in the Kegalle district. Additionally, the number of missing people (99, i.e. 85%) is highest in Kegalle.

Overall, 58,925 houses were affected, of which 6,382 were destroyed and 52,543 were damaged. Over 85 percent of the affected houses are in Colombo and Gampaha districts. District Secretaries had established 350 Safety Centres to house people evacuated from inundated areas and unsafe locations in landslide prone districts. At its peak, 114,035 people (29,474 families) stayed in these centres. Other affected people either stayed with friends or family or in makeshift locations, rooftops or above the ground floor of inundated houses.

1 United Nations CERF, 2016, Sri Lankan communities affected by flooding and landslides receive support from CERF.

The overall statistics per district are in Table 1 below.

District	Affected Families	Affected People	Deaths	Injured	Missing	Affected Houses	Safety Centres	Families in Centres	People in Centres
Ampara	17	60	0	0	0	20	0	0	0
Anuradhapura	1,442	4,729	2	0	0	150	9	143	581
Badulla	51	182	2	0	0	50	0	0	0
Batticaloa	3,172	10,748	0	0	0	15	0	0	0
Colombo	54,248	228,871	7	0	1	34,262	42	7,241	22,557
Galle	878	3,312	2	2	0	216	0	0	0
Gampaha	17,485	74,003	8	1	0	16,015	97	14,616	62,861
Hambantota	21	92	0	0	0	53	0	0	0
Jaffna	1,573	6,085	0	1	0	192	0	0	0
Kalutara	3,496	12,489	2	1	0	673	2	22	56
Kandy	1,940	7,957	7	3	0	891	41	848	2,998
Kegalle	9,620	34,833	52	0	99	3,754	23	575	1,621
Kilinochchi	5,467	18,265	0	3	0	267	12	338	1,192
Kurunegala	3,142	10,895	5	1	17	377	0	0	0
Mannar	1,885	6,627	0	0	0	38	0	0	0
Matale	202	713	0	3	0	152	4	33	109
Matara	144	551	1	1	0	143	0	0	0
Mullaitivu	1,997	5,199	0	0	0	212	0	0	0
Nuwara Eliya	259	1,109	0	0	0	78	10	120	518
Polonnaruwa	71	269	0	0	0	98	0	0	0
Puttalam	11,345	42,881	3	2	0	489	93	4,804	18,320
Ratnapura	4,508	18,154	2	15	0	571	40	1,287	4,754
Trincomalee	58	211	0	0	0	19	0	0	0
Vavuniya	1,377	5,084	0	0	0	136	0	0	0
Total	**124,398**	**493,319**	**93**	**33**	**117**	**58,871**	**373**	**30,027**	**115,567**

Table 1. Affected people and houses by district. Sources: NDRSC, Housing Sector, July 2016.

The affected districts are shown in Figure 1 below, with the priority districts highlighted in dark red. These priority districts were identified as the most severely affected districts due to the floods and landslides, by consideration of the number of people affected, initial estimates of the value of assessed damages and losses, and the presence of fatalities, injuries and missing persons. As such, due to time constraints, some sector chapters focussed exclusively on these priority districts.

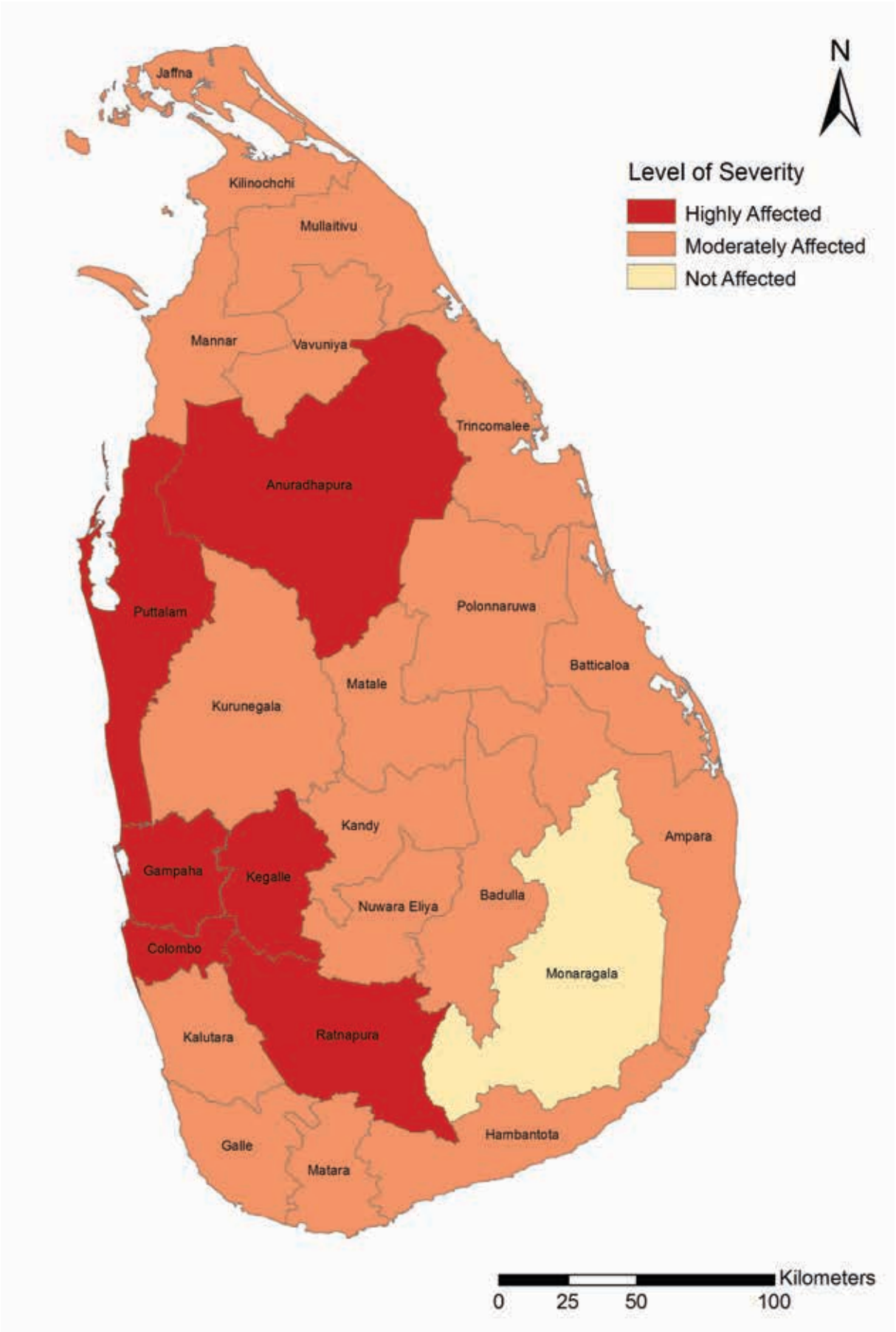


Figure 1. Affected districts. Source: GIS Unit, Mitigation Research and Development Division DMC.

Floods

The worst flooding occurred in the districts of Colombo and Gampaha, which were mostly affected because of the rising level of the Kelani River.

Floods in Colombo District have affected 228,871 members of 54,248 families in the 10 DS divisions Colombo, Homagama, Kaduwela, Kesbawa, Kolonnawa, Kotte, Maharagama, Padukka, Seethawaka and Thimbirigasyaya. By far the worst affected division countrywide is Kolonnawa where 155,062 people were affected, which is 81 percent of the total population in this division.

Floods in the Gampaha District have affected 74,003 members of 17,485 families in the 13 DS divisions Attanagalla, Biyagama, Divulapitiya, Dompe, Gampaha, Jaela, Katana, Kelaniya, Mahara, Meegamuwa, Meerigama, Minuwangoda and Wattala. The worst affected DS division in Gampaha district was Jaela, where 31,225 people were affected, which is 16% of the total population of this division.

Landslides

The most severe landslides happened in Kegalle district and are listed in Table 2.

Date	District	AGA Division	Affected Families	Affected People	Deaths	Missing
15 May 2016	Kegalle	Dehiovita	832	3,342	4	1
16 May 2016	Kandy	Udunuwara	292	1,360	6	0
17 May 2016	Kegalle	Aranayake	996	2,756	31	96
17 May 2016	Kegalle	Bulathkohupitiya	758	2,756	15	2
18 May 2016	Kegalle	Yatiyantota	997	3,810	0	0
Total			**3,875**	**14,024**	**56**	**99**

Table 2. Affected people by landslides. Source: NDRSC, June 2016.

The landslide in Aranayake is considered the worst ever-recorded in Sri Lanka. 31 bodies were recovered but 96 persons are still missing. Additionally, 110 houses were destroyed and 2,629 persons of 916 families were given shelter in 16 Safety Centres as of June 2, 2016.

Relief Operations and National and International Assistance

From the onset of the flood and landslide disaster in mid-May, the DMC within MDM initiated search and rescue operations with the assistance of the Sri Lankan Armed Forces and Police to rescue people stranded on rooftops and isolated locations. The District Secretaries established 373 safe centres, which housed over 115,000 people evacuated from the inundated areas and unsafe locations in the landslide prone districts. A number of NGOs, volunteer organisations and the media supported the Government of Sri Lanka (GoSL) in providing and distributing relief items. Since many people were stranded or trapped in their houses, which were either inundated or surrounded by water, the distribution of relief goods was highly challenging.

As of May 23, 2016 MDM had released more than LKR 117 million to District Secretariats for the initial relief work. The breakdown is shown in Table 3.

District	Allocation (LKR)
Colombo	37,000,000
Gampaha	34,000,000
Kurunegala	10,000,000
Kegalle	8,000,000
Mannar	5,500,000
Ratnapura	5,000,000
Kilinochchi	5,000,000
Puttalam	4,000,000
Anuradhapura	3,000,000
Vavuniya	3,000,000
Kandy	2,620,000
Mullaitivu	2,000,000
Nuwara Eliya	1,000,000
Kalutara	1,000,000
Galle	700,000
Jaffna	695,540
Matale	70,950
Total	**117,586,490.00**

Table 3. MDM allocation for immediate relief. Source: MDM.

The Sri Lankan armed forces played a vital role in the relief and also the recovery efforts. The Sri Lanka Army deployed more than 1,500 personnel for immediate search, rescue and relief operations, including medical support. The Sri Lanka Air Force dispatched helicopters for rescue operations and providing of relief aid to victims. Also, the Sri Lanka Navy dispatched 81 flood relief teams. The breakdown of the costs can be found in Table 4.

	Amount (LKR)
Army	16,982,251.12
Navy	26,875,174.44
Air Force	17,032,238.62
Total	**60,889,664.18**

Table 4. Costs of relief operations by Sri Lankan armed forces. Source: Ministry of Defence.

Private sector and individual donations

In addition, Sri Lankan businesses, as well as private individuals, provided money and contributions in-kind. For example, the customers of the mobile phone provider Dialog donated almost LKR15 million. Dialog provided a top-up, so that LKR 50 million was donated to the Senehe Siyapatha Initiative for Flood Relief.[2] There were various remarkable initiatives which involved social media and businesses of the sharing economy. For example, the transport companies PickMe and Uber supported the transport of relief items.[3]

2 *The Senehe Siyapatha is a disaster relief fund coordinated by DMC together with Dialog Axiata Plc, the Lake House, Sri Lanka Rupavahini Corporation and Sri Lanka Broadcasting Corporation*

3 *Perera, S., 2016, The tech you can use to help flood relief efforts.*

International Response

Based on the request made by the Foreign Ministry to the foreign missions, Sri Lanka received donations from various foreign missions, both in-kind as well as financial. An overview compiled by NDRSC can be found in Annex 6. International Response-Foreign Donations.

In addition, the UN Central Emergency Response Fund (CERF), which pools contributions from donors into a single fund for immediate use at the onset of emergencies, released US$ 4.6 million to humanitarian partners including IOM, UNFPA, UN-Habitat, UNICEF, WFP and WHO. These agencies worked closely with the Government of Sri Lanka and local NGOs to provide shelter, health, food, water and sanitation for 220,000 of the most vulnerable people. A breakdown on how the amount was spent can be found in Annex 15. Disaster Risk Reduction including Urban Risks.

The International Federation of Red Cross and Red Crescent Societies (IFRC) allocated CHF 1,590,000 (approx. LKR 240 million to enable the Sri Lanka Red Cross Society (SLRCS) to deliver assistance and support to 40,000 affected people. The operation focused on the sectors essential household items, shelter (emergency and recovery), livelihoods, water, sanitation and hygiene, health, restoring family links, disaster risk reduction and institutional disaster response capacity enhancement.

Country Profile including Disaster Profile

Sri Lanka has a land area of 65,610 square kilometres (120th in the world) and a population of 20.3 million (57th in the world). Since the end of the 27-year conflict in 2009 the possibility of a new period of sustained peace and prosperity has begun. Ever since, Sri Lanka's economy has grown at an average of 6.4 percent between 2010 and 2015, reflecting a peace dividend and a determined policy thrust towards reconstruction and growth. Despite the conflict, the 2004 tsunami and the impact of the global recession, the country has achieved middle-income status. Sri Lanka has also comfortably surpassed most of the targets for the Millennium Development Goals set for 2015.

In 2012, Sri Lanka's HDI value of 0.715 placed the country in the high human development category for the first time, positioning the country at 92nd out of 187 countries and territories. The latest HDI value for Sri Lanka is 0.757 in 2015, which ranked Sri Lanka 73rd out of 188 countries and territories. The per capita income in 2015 was US$ 3,912. Sri Lanka's economy transitioned from a previously predominantly rural-based agriculture economy towards a more urbanised economy driven by services. In 2015, the service sector accounted for 56.6 percent of the Gross Domestic Product (GDP), followed by industry (26.2 percent), and agriculture (7.9 percent).[4]

According to the World Bank,[5] strong economic growth in the last decade has led to improved shared prosperity and a critical decline in poverty. Extreme poverty remains low, as the US$ 1.90 poverty rate fell half a percentage point, from 2.4 to 1.9 percent between 2009/10 and 2012/13. The real per capita consumption of the bottom 40 percent increased 2.2 percent annually between 2006/07 and 2012/13, and improved living standards are reflected for example in rising asset ownership.

While Sri Lanka's achievements towards development are in many respects impressive, living standards remain low for most Sri Lankans and a large share of the population remains vulnerable to poverty. Despite the low levels of extreme poverty, roughly one quarter of Sri Lankans are nearly poor, as defined by living above the official poverty line but below US$ 2.50 per day. This means the most recent growth pattern has led to an increase in inequality.

4 Central Bank of Sri Lanka, 2015, Annual Report 2015.

5 Refer http://www.worldbank.org/en/country/srilanka/overview

There are significant regional differences of the poverty, which are relevant for this PDNA. There are rather high percentages of extreme poor living in the former conflict districts in the Northern Province and the Eastern Province as well as in the Monaragala district, i.e. in areas not affected much by the floods and landslides.

However, the majority of the poor as well as the bottom 40 percent live in populous, effectively urban areas of the island. These have a much higher population density than the country average of 325. And these areas, such as parts of Colombo and Gampaha districts, have been severely affected by the disaster. The demographics of the five most affected divisions are shown in Table 5.

Division	District	Affected people	Population	Population density per km^2	Below national poverty line
Kolonnawa	Colombo	155,062	190,817	6,815	5,455
Jaela	Gampaha	31,225	201,154	3,353	6,072
Kaduwela	Colombo	24,824	252,057	2,864	4,733
Colombo	Colombo	20,908	318,048	17,669	12,378
Wattala	Gampaha	20,364	174,336	3,228	4,567

Table 5. Spatial Distribution of Poverty in Sri Lanka. Source: Department of Census and Statistics 2012.

Colombo and Gampaha are concentrated with more than 45 percent of Sri Lanka's industries, while a large number of people also work in the informal sector, often home-based. These informal sector enterprises are engaged in food or garment production, brick making and floriculture or small shops. Most of them are not properly registered or insured. Many of them were severely affected by the floods.

In the landslide affected areas in Kegalle the main source of livelihood is agriculture, but the landslides have covered the cultivated land e.g. tea plots and paddy fields, and also destroyed small businesses, such as shops.

Disaster profile

The risk assessment platform INFORM, which is a collaboration of the IASC Task Team for Preparedness and Resilience and the European Commission, ranks Sri Lanka 56 out of 191 countries regarding risk of a disaster.[6] The World Risk Index 2016 ranks Sri Lanka 63 out of 171 countries.[7]

Sri Lanka has a record of many and diverse natural disasters, the 2004 tsunami being the worst one. While the 2016 floods and landslides affected almost half a million people, the five flood disasters that affected the most people in Sri Lanka are listed in Table 6.

Year	Affected people
1983	1,250,000
2014	1,100,020
2011	1,060,324
1969	1,000,000
2003	695,000

Table 6. Worst flood disasters in Sri Lanka in terms of affected people. Source: CRED.

6 *Index for Risk Management. 2016, INFORM country risk profiles for 191 countries.*

7 *Garschagen, M. et al, 2016, World Risk Report 2016.*

Although more people have been affected in previous floods it will be shown in this report that the damages of the 2016 floods and landslides are higher than before. The five flood disasters that caused the highest damage so far are listed in Table 7.

Year	Damages (US$)
2011	300,000,000
1992	250,000,000
2011	200,000,000
2010	105,000,000
1989	35,000,000

Table 7. Worst flood disasters in Sri Lanka in terms of damages. Source: CRED.

While in the landslide in Aranayake 31 people died and 96 are missing, the previous six landslide disasters that killed the most people in Sri Lanka are listed in Table 8.

Year	District	Location	Deaths
2003	Ratnapura	Abepura, Palawela	68
1993	Ratnapura	Helauda	48
2014	Badulla	Meeriyabedda	38
1977	Kandy	Gonadika Estate	26
1989	Kegalle	Bambaragala	24
1964	Kandy	Nawalapitiya	19

Table 8. Worst landslide disasters in Sri Lanka. Source: NBRO.

National Insurance Scheme

Just a few weeks before the disaster, on April 1, 2016, the Government of Sri Lanka had paid LKR 300 million as a premium to purchase its first national natural disaster cover from the country's National Insurance Trust Fund (NITF), a public body under the Ministry of Finance. This state-funded National Natural Disaster Insurance Policy (NNDIP) covers, up to certain limits, the costs of damages caused by natural disasters and emergency relief to the affected people. It focuses on households and small businesses, which are damaged due to natural hazards such as floods and landslides, but also cyclones, storms, tempests, earthquakes and tsunamis, excluding droughts. The introduction of such an insurance scheme was one of the recommendations of the Integrated Post Flood Assessment in 2010.

According to the Department of National Budget in the Ministry of Finance, the total insurance coverage is LKR 10 billion per year, of which LKR 8.5 billion is earmarked for damages caused to property and contents of households, small businesses as well as accidental death of fishermen. The balance of LKR 1.5 billion covers immediate emergency relief to the affected people.

The NNDIP is, for example, used to complement the LKR 15,000, which the MDM has provided as funeral assistance to the families of the deceased. The NITF will release the balance amount of LKR 85,000 once death certificates are issued. In addition, the Treasury has allocated LKR 150 million to cover the expenses, which are not covered under the NITF.

Catastrophe Deferred Drawdown Option

Furthermore, since 2014 the World Bank has proposed a US$ 102 million (around LKR 14.8 billion) Disaster Risk Management Development Policy Loan with a Catastrophe Deferred Drawdown Option as budget financing for the GoSL for an initial period of three years. This project is aiming to enhance the capacity of the GoSL to be more resilient to the impacts of natural disasters by providing immediate liquidity if a disaster occurs. In the aftermath of the May 2016 disasters, the GoSL has withdrawn the facility fully amounting to US$ 101.49 million.

Disaster Effect and Impact

The outcome of the PDNA was that the total effect of the disaster is LKR 105 billion, which comprises damages worth LKR 87 billion (83%) and losses worth LKR 18 billion (17%). Of the assessed damages and losses, not all could be broken down by district level due to various reasons.[8] Therefore as seen in Figure 2 below, damages that were available district-wise account for 75 percent of the total effect, and losses that were available district-wise account for 11 percent of the total effect.

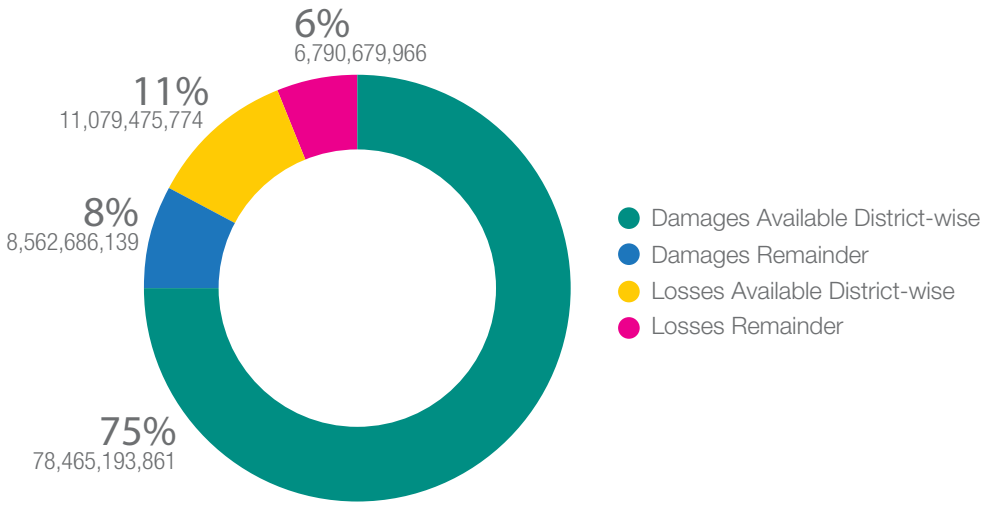


Figure 2. Summary of damages vs. losses. Source: PDNA team.

8 *This includes different regional data collection methods by some sectors (which did not follow district layouts); distinct zoning jurisdictions used by some Ministries; damages and losses associated with Moneragala that only some sectors reported (Moneragala is not considered affected in the overall Executive Summary); as well as the limitations with further disaggregating data due to the limited time period of the PDNA*

The distribution of **available** damages and losses by district is given in Figure 3 below.

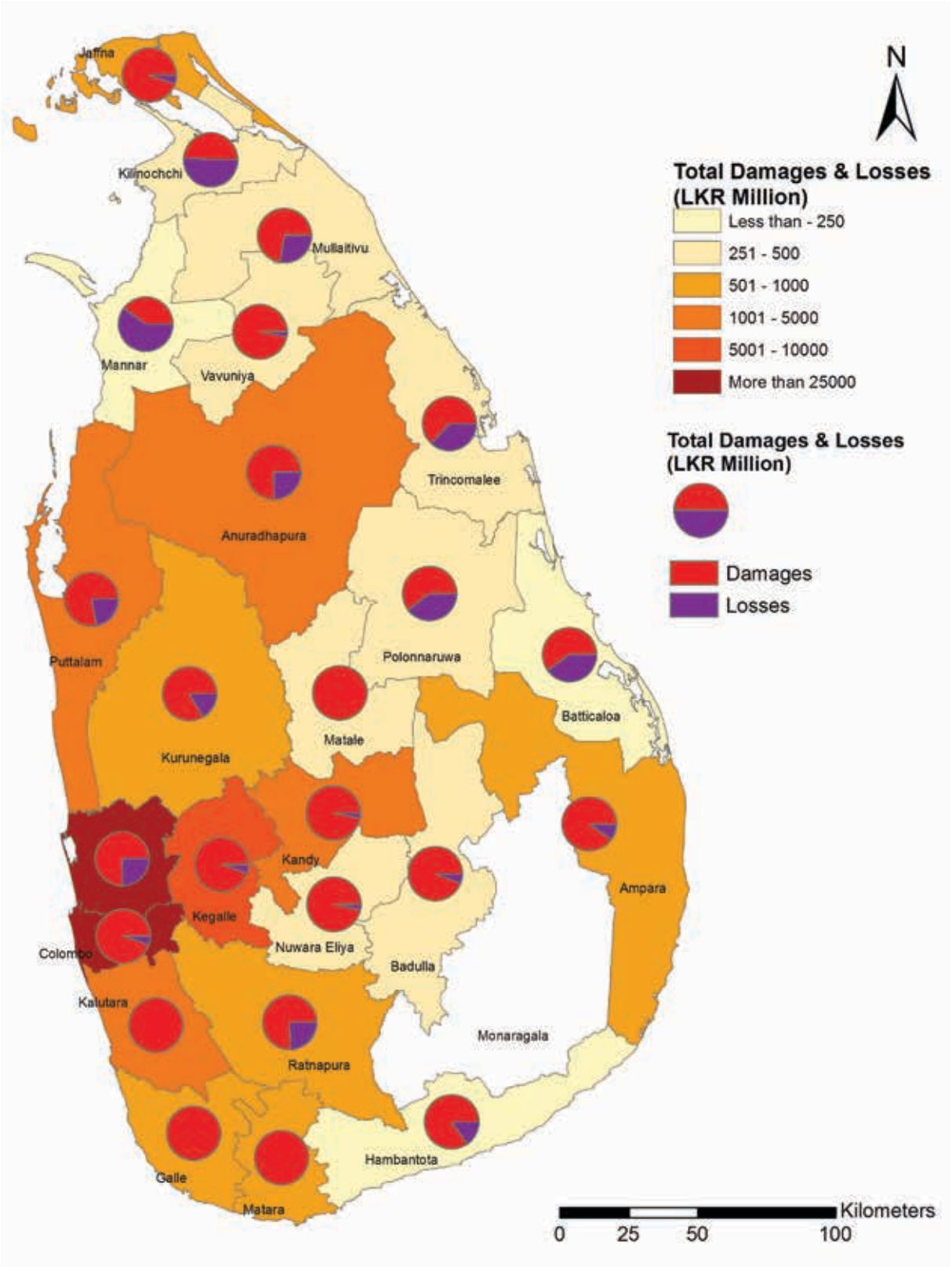


Figure 3. Available district-wise distribution of damages and losses. Source: PDNA team.

Table 9 and Table 10 below show the effects of the disaster by sector, and represent all of the assessed damages and losses. The available data for the sector chapters that reported damages and losses by district is given in Annex 3. District Breakdown of Damages and Losses.

Sectors	Damages (LKR)	Losses (LKR)	Total Effect (LKR)	Total Effect (US$)
Social Sectors	**56,825,850,000**	**472,872,285**	**57,298,722,285**	**395,163,602**
Housing, Land and Settlements	55,821,850,000	256,000,000	56,077,850,000	386,743,793
Health and Nutrition	478,500,000	118,682,285	597,182,285	4,118,499
Education	525,500,000	98,190,000	623,690,000	4,301,310
Productive Sectors	**23,593,530,000**	**10,971,860,000**	**34,565,390,000**	**238,382,000**
Food Security, Agriculture, Livestock, Fisheries	1,698,050,000	1,901,750,000	3,599,800,000	24,826,207
Industry and Commerce	21,895,480,000	9,070,110,000	30,965,590,000	213,555,793
Infrastructure Sectors	**6,441,100,000**	**574,220,000**	**7,015,320,000**	**48,381,517**
Irrigation	1,723,420,000	0	1,723,420,000	11,885,655
Water and Sanitation	366,620,000	76,520,000	443,140,000	3,056,138
Transport	4,143,400,000	43,500,000	4,186,900,000	28,875,172
Power Supply	207,660,000	454,200,000	661,860,000	4,564,552
Cross Cutting Issues	**167,400,000**	**5,851,203,455**	**6,018,603,455**	**41,507,610**
Environment	27,400,000	542,842,332	570,242,332	3,932,706
Disaster Risk Reduction	140,000,000	254,361,123	394,361,123	2,719,732
Employment & Livelihoods	0	5,054,000,000	5,054,000,000	34,855,172
Gender and Social Inclusion	0	0	0	0
Total	**87,027,880,000**	**17,870,155,740**	**104,898,035,740**	**723,434,729**
Total US$ (1 US$ = 145 LKR)	**600,192,276**	**123,242,453**	**723,434,729**	

Table 9. Floods and landslides 2016, total damages and losses. Sources: PDNA team.

By far the worst affected is the Housing, Land and Settlements sector, accounting for over 53.5 percent of the total effect. The Industry and Commerce sector contributes almost 30 percent, while all other sectors are clearly below 10 percent.

Even more extreme is the distribution of the **damages**. Almost two thirds of all damages are within the Housing, Land and Settlements sector and one quarter is within the Industry and Commerce sector. All other sectors are below five percent.

The situation is different for the losses. Over 50 percent of the **losses** are within the Industry and Commerce sector. Also significant are the Employment and Livelihoods sector with almost 30 percent and the Food Security, Agriculture, Livestock, Fisheries sector with over 10 percent of all losses. Here, the Housing, Land and Settlements sector is under two percent.

Sectors	Damages	Losses	Total Effect
Total in LKR	87,027,880,000	17,870,155,740	104,898,035,740
Total in US$ (1 US$ = 145 LKR)	600,192,276	123,242,453	723,434,729
Sectors	**Damages (%)**	**Losses (%)**	**Total Effect (%)**
Social Sectors	65.3	2.7	54.6
Housing, Land and Settlements	64.1	1.4	53.5
Health and Nutrition	0.6	0.7	0.6
Education	0.6	0.6	0.6
Productive Sectors	27.1	61.4	33.0
Food Security, Agriculture, Livestock, Fisheries	2.0	10.6	3.4
Industry and Services	25.2	50.8	29.5
Infrastructure Sectors	7.4	3.2	6.7
Irrigation	2.0	0.0	1.6
Water and Sanitation	0.4	0.4	0.4
Transport	4.8	0.2	4.0
Power Supply	0.2	2.5	0.6
Cross Cutting Issues	0.2	32.7	5.7
Environment	0.0	3.0	0.5
Disaster Risk Reduction	0.1	1.4	0.4
Employment & Livelihoods	0.0	28.3	4.8
Gender and Social Inclusion	0.0	0.0	0.0
Total	**100**	**100**	**100**

Table 10. Damages and losses-percentages by sector from total. Sources: PDNA and sector teams.

Figure 4 below illustrates these effects by sector category.

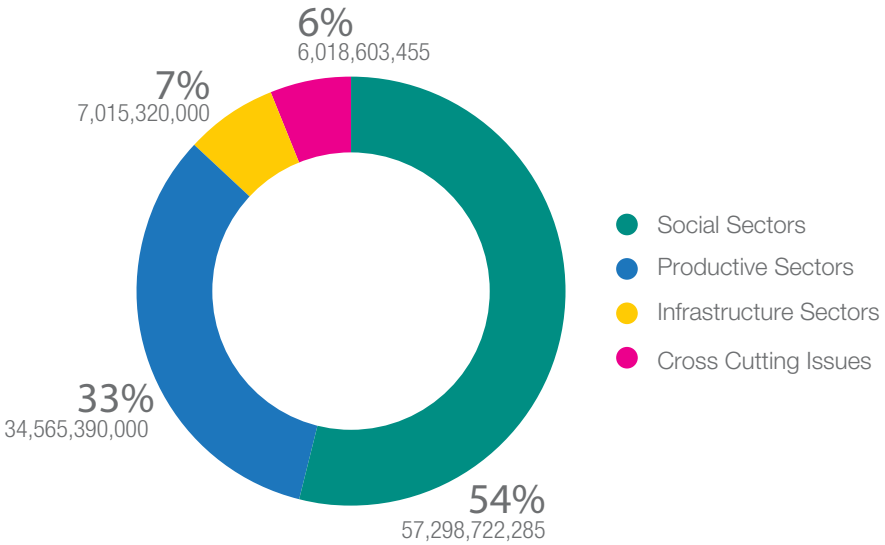


Figure 4. Effects by sector category. Sources: PDNA-and sector teams.

Comparison private vs. public effects

Out of the overall effect of LKR 105 billion the effects to the private sector were LKR 94.66 billion (90.2%) and the effects to the public sector were LKR 10.24 billion (9.8%). See also Figure 5 below.

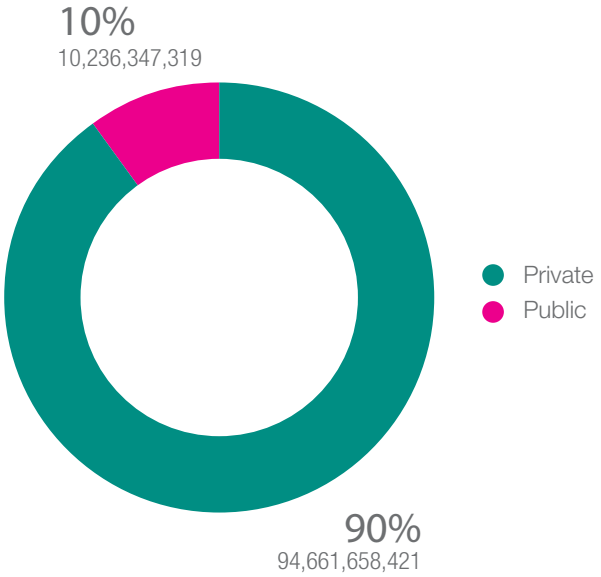


Figure 5. Private vs. public effects. Sources: PDNA and sector teams.

The breakdown by sector is shown in Table 11 below.

Sectors	Private (LKR)	%	Public (LKR)	%
Social Sectors	55,834,110,000	58.98	1,464,582,285	14.31
Housing, Land and Settlements	55,821,850,000	58.97	256,000,000	2.5
Health and Nutrition	0	0	597,182,285	5.83
Education	12,260,000	0.01	611,400,000	5.97
Productive Sectors	33,249,290,000	35.12	1,316,100,000	12.86
Food Security, Agriculture, Livestock, Fisheries	2,283,700,000	2.41	1,316,100,000	12.86
Industry and Commerce	30,965,590,000	32.71	0	0
Infrastructure Sectors	424,150,000	0.45	6,591,170,000	64.39
Irrigation	0	0	1,723,420,000	16.84
Water and Sanitation	424,150,000	0.45	18,990,000	0.19
Transport	0	0	4,186,900,000	40.9
Power Supply	0	0	661,860,000	6.47
Cross Cutting Issues	5,154,108,421	5.44	864,495,034	8.45
Environment	0	0	570,242,332	5.57
Disaster Risk Reduction including Urban Risks	100,108,421	0.11	294,252,702	2.87
Employment & Livelihoods	5,054,000,000	5.34	0	0
Gender and Social Inclusion	0	0	0	0
Total	**94,661,658,421**	**100**	**10,236,347,319**	**100**

Table 11. Damages and losses-breakdown between private and public sector. Source: PDNA team

Similar to the overall effects also in the **private sector** the Housing, Land and Settlements sector accounts for over 50 percent and the Trade and Industries sector for over 30 percent of the total amount. Among the other sectors only 'Food Security, Agriculture, Livestock, Fisheries' and 'Employment and Livelihoods' are over one percent.

In the **public sector,** the situation is very different and over 40 percent of the total effect to the public sector comes from the Transport sector and over 29 percent from irrigation infrastructure damages. These are both infrastructure sectors (although over 12 percent of the irrigation damages are reported in the 'Food Security, Agriculture, Livestock, Fisheries' as they fall within the jurisdiction of the Ministry of Agriculture), i.e. mostly not in private hands. The Housing, Land and Settlements sector accounts for 2.5 percent only, which is entirely the amount of the losses in this sector (See above in Table 9). Four other sectors are over five percent, which are Education, Health and Nutrition, Power Supply and Environment.

2016 floods and landslides an urban disaster

From the assessment, it can be concluded that this event is predominantly an urban disaster. The impact of the floods was felt more in the greater metropolitan areas of Colombo and Gampaha which has the highest population density as well the highest number of people living in poverty and vulnerable to poverty.[9] More than 60 percent of the total population affected by the floods and over 85 percent of the total houses damaged are from Colombo, and Gampaha Districts. The two districts also account for almost 25 percent of the trade and industries sector, which were affected the most in the recent floods.

With regard to education and health services, 101 of the 172 schools damaged in the floods are in these two districts causing disruption in schools. The damage to the health service is reported the highest in the 0Colombo district followed by Kegalle and Gampaha. Water and sanitation services were hard hit in the two districts. 78 percent of the total estimated damages to toilets and wells in the top five severely affected districts are in these two districts.

The environmental impacts of floods were felt acutely in parts of the Colombo metropolitan areas due to the mix of sludge from industries, leachate from municipal solid waste (MSW) dumps and sewage from septic tanks, which mixed with the flood water and created a toxic waste. Dumping sites in Colombo and Gampaha were affected as some sites went under floodwater (e.g. Kaduwela), while others like Meethotamulla suffered partial collapse.

In comparison to Colombo and Gampaha, the total number of people affected by the floods and landslides in the 22 other districts was around 39 percent and housing only 15 percent. The impact is very low in health and education services. However, 99 percent of the damages and losses in the agriculture sector is in rural districts with highest reported in Anuradhapura, followed by Mullaitivu, Polonnaruwa, Trincomalee and Puttalam. Similarly, the damage to irrigation infrastructure supporting the agriculture services is also highest in Anuradhapura, Puttalam and Jaffna. This has a high impact on the 1.8 million farming families who are engaged in paddy cultivation island-wide, particularly for the 40 percent of the population in the Northern and Eastern provinces who are identified as food insecure.[10] The poverty headcount ratio is also higher in the districts whose income is based on agriculture.

Cross-cutting Issues

The PDNA found that women, particularly female-headed households (FHHs), were the more affected population of the disaster in the six most affected districts. However, in depth research in this regard was severely hindered due to the lack of sex and age disaggregated pre and post-disaster data. The disaster also had a negative impact on children's access to education after the disaster.

The floods and landslides have also caused significant environmental damage e.g. to ecosystems and to infrastructure related to environment management. Damage was also caused due to leakages from

9 *World Bank, 2015, Sri Lanka: Ending poverty and promoting shared prosperity-a systematic country diagnostic.*

10 *Source: World Food Programme, 2012*

municipal solid waste dumps and due to contamination of pollutants from industries mostly located in the Kelani river basin.

The disaster highlighted a series of shortfalls in the disaster risk management in Sri Lanka, which includes last mile early warning dissemination, disaster response at local level, community preparedness in urban areas, information management and coordination among stakeholders. Therefore, the recovery aims to enhance coordinated preparedness and response systems, to strengthen institutional capacity building at the local level and to include all vulnerable groups under social protection schemes.

Recovery Needs

The Government of Sri Lanka will lead the recovery and reconstruction efforts. Options to fund the recovery are insurance for housing reconstruction and asset replacement, budgetary reallocations, usage of the CAT-DDO[11] for large infrastructure projects, loans or grants from multilateral and bilateral agencies, or contributions from the private sector.

A variety of principles will guide the recovery strategy, aiming at improving the quality of recovery, emphasizing equity and inclusion, and promoting risk reduction. The recovery strategy is based on the resilience-and sustainability-oriented 'Building Back Better' (BBB) approach. BBB interventions are intended to strengthen disaster-risk management of the government and communities and reduce risks and vulnerabilities to future disasters, to catalyse the economy and rebuild livelihoods, which are different from interventions that merely restore and resume to pre-disaster levels.

The time range for the short-term needs is until the end of 2016, while the medium-term needs are projected for the year 2017 and the long-term needs for the three years from 2018 to 2020. An exception is the Housing, Land and Settlements sector since resettlement will continue beyond 2020 due to the large operation.

The outcome of the PDNA was that the total recovery needs after the disaster are LKR 139 billion. Out of this amount are LK R6.7 billion (4.8%) was assessed necessary to address short-term needs, LKR 35.3 billion (25.4%) to address medium-term needs and LKR 97.0 (69.8%) to address long-term needs. Due to the limitations experienced in disaggregating damages and losses by district, not all of the recovery needs could be broken down by district. Figure 6 below illustrates the division of available district wise recovery needs against the remainder.

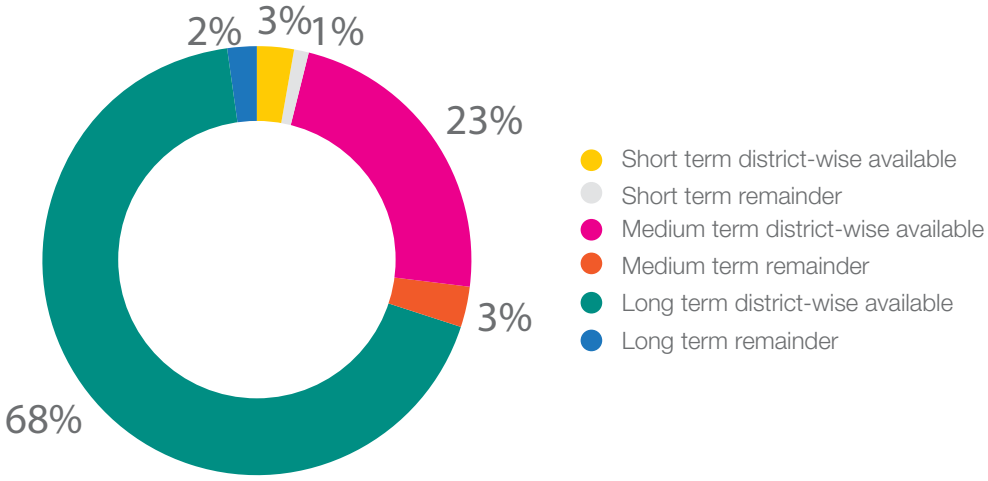


Figure 6. Summary of short, medium and long-term recovery needs. Source: PDNA team.

11 *Catastrophe Deferred Drawdown Option of the World Bank*

The distribution of the **available** recovery needs by district, in the short, medium and long-term, is given below in Figure 7; whereas Table 12 below this map show the **total** recovery needs of the disaster by sector. The available data for the sector chapters that reported recovery needs by district is given in Annex 4. District Breakdown of Recovery Needs.

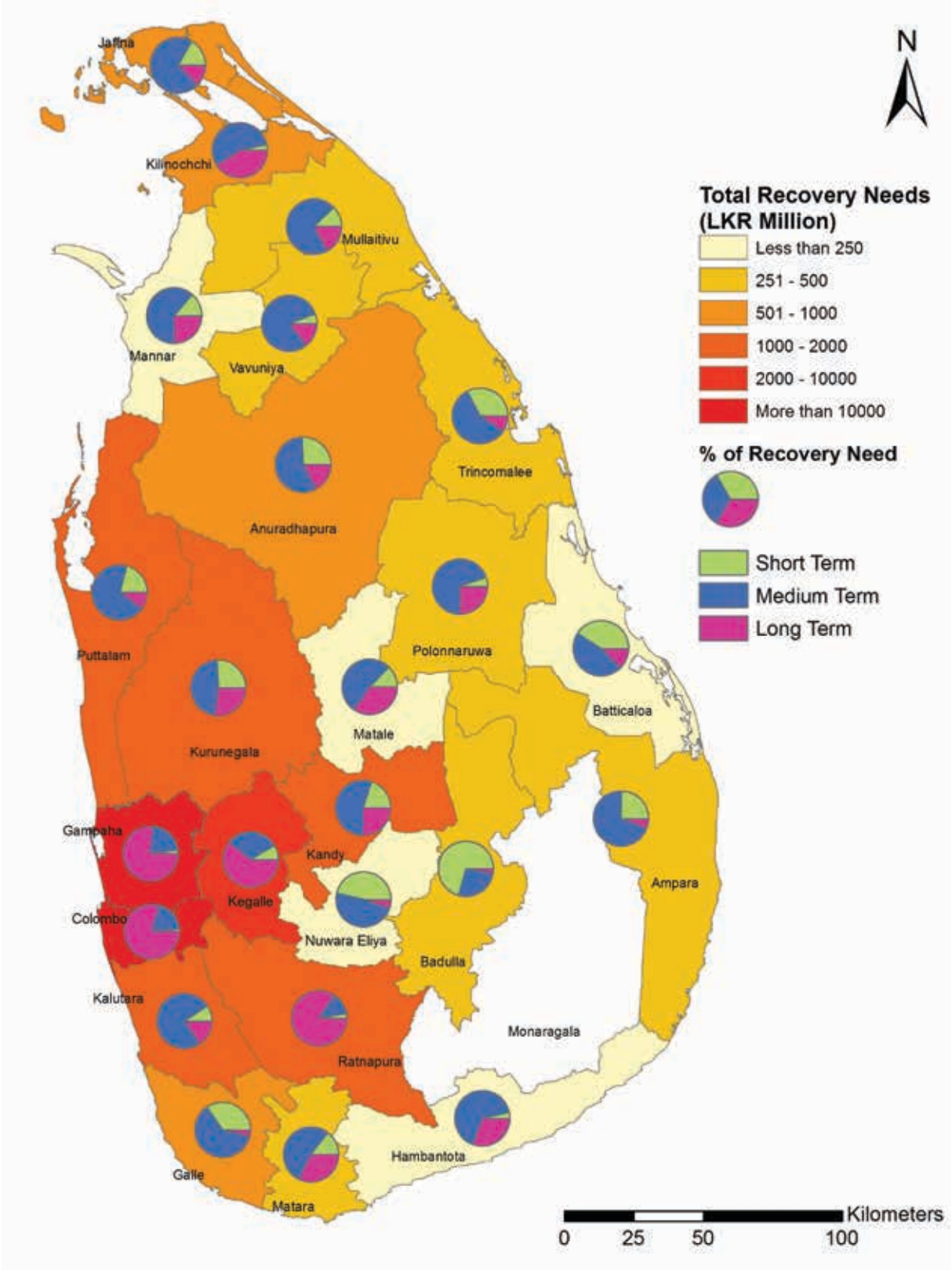


Figure 7. Available district wise recovery needs in the short, medium and long-term. Source: PDNA team.

An overview of all recovery needs by sector is given in Table 12 below.

Sector	Short-term Needs (until Dec 2016)	%	Medium-term Needs (Jan - Dec 2017)	%	Long-term Needs (Jan 2018 - Dec 2020)	%	Total Needs (LKR)	Total Needs (US$)	%
Social Sectors	623,810,000	9.3	29,518,980,000	83.5	93,795,914,760	96.7	123,938,704,760	854,749,688.00	89.1
Housing, Land and Settlements	243,930,000	3.7	28,747,590,000	81.3	93,501,454,760	96.4	122,492,974,760	844,779,136.28	88.1
Health and Nutrition	308,800,000	4.6	583,800,000	1.7	140,000,000	0.1	1,032,600,000	7,121,379.31	0.7
Education	71,080,000	1.1	187,590,000	0.5	154,460,000	0.2	413,130,000	2,849,172.41	0.3
Productive Sectors	396,000,000	5.9	1,524,000,000	4.3	518,500,000	0.5	2,438,500,000	16,817,241.38	1.8
Food Security, Agriculture, Livestock, Fisheries	396,000,000	5.9	1,508,000,000	4.3	507,500,000	0.5	2,411,500,000	16,631,034.48	1.7
Industry and Commerce	0	0.0	16,000,000	0.1	11,000,000	0.0	27,000,000	186,206.90	0.0
Infrastructure Sectors	4,058,840,000	60.8	851,940,000	2.4	2,079,200,000	2.1	6,989,980,000	48,206,758.62	5.0
Irrigation	30,000,000	0.5	338,000,000	1.0	1,600,000,000	1.7	1,968,000,000	13,572,413.79	1.4
Water and Sanitation	41,500,000	0.6	206,600,000	0.6	422,000,000	0.4	670,100,000	4,621,379.31	0.5
Transport	3,987,340,000	59.7	0	0.0	0	0.0	3,987,340,000	27,498,896.55	2.9
Power Supply	0	0.0	307,340,000	0.9	57,200,000	0.1	364,540,000	2,514,068.97	0.3
Cross Cutting Issues	1,602,000,000	24.0	3,449,000,000	9.8	648,500,000	0.7	5,699,500,000	39,306,896.55	4.1
Environment	38,000,000	0.6	105,500,000	0.3	87,000,000	0.1	230,500,000	1,589,655.17	0.2
Disaster Risk Reduction	4,000,000	0.1	127,500,000	0.4	188,500,000	0.2	320,000,000	2,206,896.55	0.2
Employment & Livelihoods	1,528,000,000	22.9	3,216,000,000	9.1	373,000,000	0.4	5,117,000,000	35,289,655.17	3.7
Gender and Social Inclusion	32,000,000	0.5	0	0.0	0	0.0	32,000,000	220,689.66	0.0
Total	**6,680,650,000**	**100**	**35,343,920,000**	**100**	**97,042,114,760**	**100**	**139,066,684,760**	**959,080,584.55**	**100**
Total US$ (1 US$ = 145 LKR)	**46,073,448.28**		**243,751,172.41**		**669,255,963.86**		**959,080,584.55**		

Table 12. Floods and landslides 2016, total recovery needs. Source: PDNA team.

Areas of recovery of the main sectors

Figure 8 below illustrates the recovery needs by sector category.

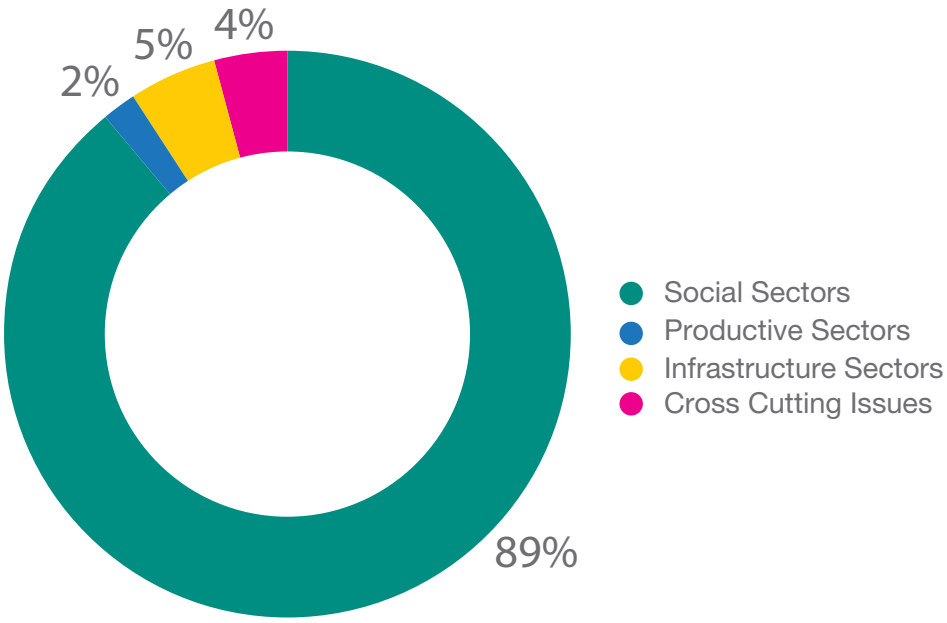


Figure 8. Recovery needs by sector category. Source: PDNA team.

By far the largest recovery operation has to be taken on by the Housing, Land and Settlements sector (88.1% of the overall recovery needs). This will comprise the in-situ repair and reconstruction of 29,621 minor and partially damaged houses and 1,654 destroyed houses in low-risk areas, the relocation of 2,361 houses affected by landslides as well as the relocation of 25,289 houses affected by floods and located in reservations and buffer zones of the Kelani River basin.

The Employment and Livelihoods sector is planning the second largest, yet significantly smaller recovery operation (3.7% of the overall recovery needs). For the time period until the end of 2016 an Emergency Employment Programme is planned. For 2017 the focus is on the revitalisation of livelihoods and employment, especially for self-employed individuals. And in the long run the aim is to build more resilient livelihoods and employment. Since the Emergency Employment Programme has a high priority this accounts for a substantial portion of the short-term recovery needs (22.9% of the overall short-term recovery needs).

The third largest amount for recovery is required for the Transport sector (2.9% of the overall recovery needs), which aims to restore the high mobility network in the disaster affected areas albeit based on BBB principles. Due to the urgency the sector plans to spend the whole amount before the end of 2016. Therefore, in comparison the Transport sector has by far the highest short-term recovery needs (59.7% of the overall short-term recovery needs). The sector plans to spend 57 percent of the total amount on national roads, 42 percent on provincial roads and 1 percent on railway network.

The Food Security, Agriculture, Livestock, Fisheries sector (1.7% of the overall recovery needs) plans in the short run to restore the production levels in crop, livestock and fisheries. The sector then focuses to build back the damaged agricultural infrastructure and to improve the farming skills of the farmers to minimize future losses. In the long run degraded watersheds and mangroves in the flood-affected regions will be restored.

The focus of the Irrigation sector (1.4% of the overall recovery needs) is to repair the damages and restore the damaged irrigation and flood control infrastructure, with the objective of minimizing economic losses in the Food Security, Agriculture, Livestock and Fisheries sector.

All other sectors require less than one percent of the overall amount.

Figure 9 below compares the effect and the recovery needs of the four sector categories.

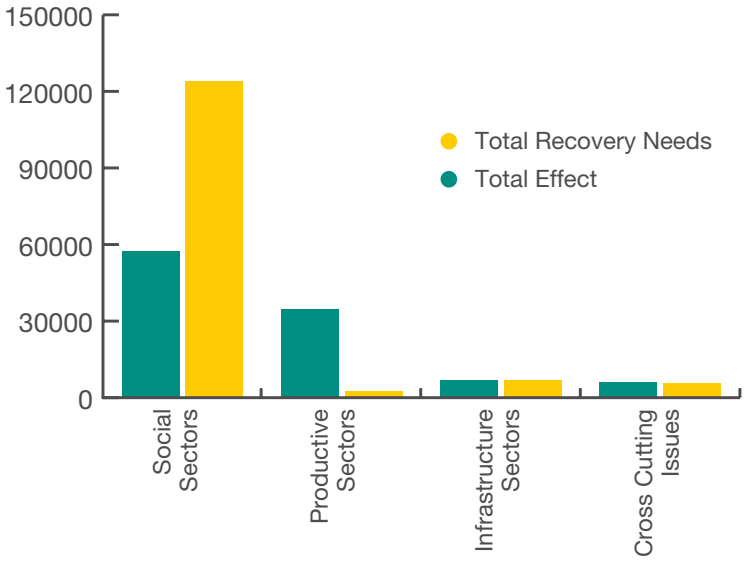


Figure 9. Effects and recovery needs by sector category. Sources: PDNA team.

Assessment Methodology and Process

Methodology

The PDNA in Sri Lanka was a government-led exercise, supported by a multidisciplinary, multiagency team. The assessment is built on the initial sector damage assessments undertaken by central and local governments.

The PDNA guidelines have three main elements: assessment of disaster effects, assessment of disaster impact, and recovery strategy and needs. The PDNA starts with the collection of pre-disaster baseline data and uses this information to build the context prior to the disaster to compare with post-disaster conditions in order to evaluate the disaster impact and to determine the overall recovery strategy. It combines quantitative data with qualitative information and analysis to assess the impact of the disaster and develop the recovery needs and strategy. The recovery needs include not only costs for repair and reconstruction but also costs for improvement of services, policies, capacity building needs and new structures that are urgently required to make the sector more resilient to future disaster.

The key source of information for the assessment was baseline data and secondary data from respective line ministries and departments. Data from other existing or on-going assessments was used to complement the data provided by the line ministries. The data provided by the line ministries was validated through a combination of multi-sector field assessments, desk reviews, site visits by sector specialists, and interviews with key stakeholders.

The PDNA includes a total of 15 chapters, which are divided into the categories-social, productive, infrastructure and cross-cutting. In addition, two chapters on the overall impact are also included in the PDNA. A full list of the chapters is provided in the Table 13:

Sector category	Sector
Social Sectors	Housing, Land and Settlements
	Health and Nutrition
	Education
Productive Sectors	Food Security, Agriculture, Livestock, and Fisheries
	Industry and Commerce
Infrastructure Sectors	Irrigation
	Water and Sanitation
	Transport
	Power Supply
Cross Cutting Issues	Environment
	Disaster Risk Reduction
	Gender and Social Inclusion
	Employment and Livelihoods
Impact	Macro-Economic Impact
	Human Development Impact

Table 13. Sectors of the PDNA 2016 in Sri Lanka.

The scope of this PDNA covers the 24 affected districts, which are Ampara, Anuradhapura, Badulla, Batticaloa, Colombo, Galle, Gampaha, Hambantota, Jaffna, Kalutara, Kandy, Kegalle, Kilinochchi, Kurunegala, Mannar, Matale, Matara, Mullaitivu, Nuwara Eliya, Polonnaruwa, Puttalam, Ratnapura, Trincomalee, and Vavuniya. Only Monaragala was not included.[12]

However, since the districts were not equally affected, for this PDNA the following six districts are considered priority districts: Anuradhapura, Colombo, Gampaha, Kegalle, Puttalam, and Ratnapura. These six districts were selected according to the following criteria: Number of affected people, number of destroyed or damaged houses, flood inundation, contribution to the economy and agriculture. Table 14 below shows the number of affected people in these districts in relation to the overall population.

District	Affected Families	Affected People	Overall population	%
Anuradhapura	1,442	4,729	860,575	0.55
Colombo	54,248	228,871	2,324,349	9.85
Gampaha	17,485	74,003	2,304,833	3.21
Kegalle	9,620	34,833	840,648	4.14
Puttalam	11,345	42,881	762,396	5.62
Ratnapura	4,508	18,154	1,088,007	1.67
Total	**98,648**	**403,471**	**8,180,808**	**4.93**

Table 14. Affected people in the six priority districts.
Sources: NDRSC, July 2016, Department of Census and Statistics, 2012.

12 *Some of the sectors below have identified sector-specific effects and impacts of the disaster in Monaragala, which are described in the respective chapters.*

Process

On 27 May 2016, the Ministry of National Policies and Economic Affairs of the Government of Sri Lanka commissioned the PDNA. The Terms of Reference for the assessment were drafted and approved by the GoSL. The Sri Lankan MDM led the PDNA with the assistance of United Nations agencies, the World Bank, the European Union, and other relevant stakeholders.

Government ministries led the sectoral assessments and UN agencies or the World Bank were co-lead. Each ministry nominated a focal point for the sector assessment, who led the data collection, drafting of the report and its validation within the ministry. Each sector report provides more detailed information on the sector assessment methodology. The MDM had been instrumental in influencing the participation of the ministries to support the sector teams and to provide them with access to data from ministries.

Timeline

A detailed timeline had been included in the Annex 2. Terms of Reference.

The PDNA commenced on July 18 and 19, with a two-day training workshop for the line ministries, UN agencies, World Bank and other stakeholders. Following the training, data collection as well as compilation and analysis of the information were undertaken for a period of two weeks. The sector teams organised bilateral meetings with key stakeholders to access information and their views on the post floods and landslides situation. Field visits were conducted by the members of the PDNA team, agencies and the Ministry of Women and Child Affairs to the severely affected Grama Niladhari divisions of Colombo, Gampaha, Puttalam Anuradhapura and Kegalle and met with key government informants as well as affected people. The MDM organised a consultation with international and national NGOs to seek their views and information on the assessment and recovery needs. On August 5, the PDNA Coordinator presented the initial findings to the GoSL during a half-day workshop, which was again attended by all stakeholders. Thereafter, the findings and the sector chapters were consolidated and endorsed by respective Government ministries. In October 2016 the full PDNA report was presented to the Government.

Constraints

The PDNA team faced a number of constraints in conducting the assessment. The PDNA was conducted in the very short time frame of six weeks. It was challenging to collect all the information on damages and losses from each of the 24 affected districts. Several sectors, such as the Industry and Commerce sector, had not yet started an assessment. Similarly, there was a lack of information on impact on fisheries and livestock for all the districts and also a lack of data on the effects of the disaster on livelihoods and employment in both the formal as well as the informal sector. The assessment teams had to use proxies to come to conclusions. In addition, the non-availability of disaggregated data by sex, age and disabilities made it difficult to provide a comprehensive report of the effects on the most vulnerable. However, despite these limitations, the assessment team was able to construct a reasonable picture due to the field visits and consultations with key stakeholders.

Sector Reports

Social Sectors

Housing, Land and Settlements

Executive Summary

The purpose of the Housing, Land and Settlements sector assessment is to:

1. Better understand and quantify the extent of damage and loss caused by the disaster.
2. Aid in formulating the effective response mechanisms for the affected people.
3. Present recommendations to increase resilience of housing and settlements in affected areas against future hydro-meteorological disasters.

The total damage in the housing, land and settlements sector was estimated as LKR 55.82 billion, the total loss as LKR 256 million and the total needs as LKR 122.49 billion across 25 disaster affected districts in the country. The baseline data was provided by the Census of Population and Housing 2012 and Household Income and Expenditure Survey 2012/2013. The housing damage information was provided by National Disaster Relief Services Centre (NDRSC), which obtained these figures from detailed and extensive assessment for estimating the damage for National Disaster Insurance compensation. Construction costs are based on estimates made by National Building Research Organisation (NBRO) based on rates provided by NDRSC.

58,925 houses were affected by the disaster of which 6,382 were fully damaged and 25,958 were partially damaged, while 26,585 houses suffered minor damages. Over 60 percent of the damage was reported from the urban flooding affected Colombo and Gampaha Districts, and the landslide affected areas of the Central and Sabaragamuwa Provinces. The sector analysis focuses on strategies for reducing future disaster risks not only for the affected households but also for neighbouring communities and the protection of key economic assets in urban and estate areas. The Key reconstruction strategies include:

- In-situ repair and reconstruction of 29,621 minor and partially damaged housing units and 1,654 fully damaged housing units in low-risk areas. This cost is estimated at LKR 27.5 billion.
- Relocation of 2,361 houses affected by landslides inclusive of 1,682 units in Kegalle District, and the Estate sector to low landslide risk areas. The cost is estimated at LKR 5.8 billion, inclusive of the cost of land, settlement planning and land preparation, and house construction.
- Relocation of 25,289 flood-affected housing units located in reservations and buffer zones of the Kelani River basin in urban and peri-urban areas of Colombo and Gampaha Districts. The cost is estimated at LKR 77 billion, which is equivalent to 70 percent of the total housing reconstruction cost. This may be addressed through long-term Development Programmes of GoSL such as the Western Region Megapolis Plan, which includes relocation of informal settlements, and establishment and enforcement of eco-zones along the Kelani River basin.

The total cost of needs (LKR 122,493 million) is considerably higher due to the incorporation of build back better principles including replacement of affected improvised housing units with permanent houses and relocation of over 25,289 housing units located in reservations and buffer zones of the Kelani River.

The key recommendations from the sector include: 1) adoption of reconstruction strategies accordance with the type of disaster and the location (urban, estate or rural), 2) ensure community participation from the planning process right through implementation, 3) adopt housing reconstruction approaches in the preferred order as follows, as per the locational context: in-situ home owner driven, voluntary relocation with home owner driven, government facilitated relocation with community driven, government facilitated relocation with contractor or military driven, 4) integrate the reconstruction process into government through

prioritisation of support to disaster affected families under the proposed development programmes such as the Western Region Megapolis Planning Project and National Plan of Action for Plantations, 5) set up institutional reforms for enforcement of environmental and land use planning legislation and building codes through local government authorities, 6) build capacities for mainstreaming DRR in all technical curricula and construction industry as well as for local governments and other regulatory bodies enforce building codes, 7) ensure equitable compensation and support and, 8) improve access to sustainable housing finance options.

Pre-disaster Context and Baseline

Housing situation with context (urban, rural, estate)

Settlements in Sri Lanka are classified as urban, rural and estate by the Department of Census and Statistics based on their social, economic, and political characteristics. This classification is important to understand the characteristics of the housing stock, land use, and settlement conditions. Based on the principal construction materials, the houses are further classified into three categories, as permanent, semi-permanent and improvised. The definitions for settlement types and housing categories are provided in Table 15 and Table 16 below:

Urban sector	All areas administered by Municipal and Urban councils constitute the urban sector.
Estate sector	Estate sector consists of all plantations which are 20 acres or more in extent and with ten or more resident labourers.
Rural sector	All areas other than urban and estate comprise the rural sector.

Table 15. Definition of sector (urban, estate and rural). Source: Department of Census and Statistics.[13] [14]

Type of housing unit	Type of principal material of unit		
	Wall	Roof	Floor
Permanent	Brick/Cabook/Cement blocks/ Stone/Pressed soil blocks	Tile/Asbestos/Concrete/ Metal sheets	Cement/Terrazzo/Tile/ Granite/Wood
	Mud	Tile/Asbestos/Metal sheets	Cement
Semi-permanent	Brick/Cabook/Cement blocks/ Stone/Pressed soil blocks	Tile/Asbestos/Metal sheets	Mud
	Brick/Cabook/Cement blocks/ Stone/Pressed soil blocks	Cadjan/Palmyrah/Straw/ Metal sheets	Cement/Mud/Wood
	Mud	Tile/Asbestos/Metal sheets	Mud/Wood
	Mud	Cadjan/Palmyrah/Straw	Cement/Mud/Wood
	Plank/Metal sheets	Tile/Asbestos/Metal sheets	Cement/Mud/Wood
	Plank/Metal sheets	Cadjan/Palmyrah/Straw	Cement
Improvised	Cadjan/Palmyrah/Straw	Any material	Any material
	Plank/Metal sheets	Cadjan/Palmyrah/Straw	Mud/Wood/Sand

Table 16. Basis of classification of housing units. Source: Department of Census and Statistics.

The latest data from the Census of Population and Housing (2012)[15] indicates that there are 20,359,439 people living in 5,144,145 housing units in the 25 disaster-affected districts.

13 *Department of Census and Statistics, 2010, Concepts and definitions.*

14 *20 acre equals 80,937.1m²*

15 *Department of Census and Statistics, 2012, Census of Population and Housing 2012.*

Out of these houses, more than 80 percent are permanent, leaving about 19 percent as semi-permanent housing, with improvised housing accounting for less than 1 percent. However, Nuwara Eliya district has a significantly lower ratio of permanent housing (less than 40%) and a high ratio of the semi-permanent houses (60%). The district has the highest population of the estate sector (53% against total district population), which can be attributed to the high number of semi-permanent houses, commonly known as line rooms. Similarly, Kilinochchi and Mullaitivu districts also have a lower ratio of the permanent houses and a high rate of the improvised houses, which is attributed to the fact that the majority of the occupants had not reconstructed their houses destroyed by the conflict and were living in transitional shelters at the time of the 2012 census. Colombo and Gampaha districts have a high rate of permanent houses (93.62% and 89.94%) and a high number of improvised houses at the same time, which is explained by the presence of high-density informal settlements in urban areas bordering the Kelani River. These districts have the highest in-migrant ratio (16%) and the highest population density due to high economic growth and employment opportunities, which has resulted in land scarcity, high land prices, which cannot be afforded by the low income settlers of these informal settlements.

Governance

The governance system for the housing, land and settlements is complex, administered by different ministries and authorities and at different administration levels. The Ministry of Housing and Construction is the key stakeholder at national level for housing, while the Ministry of Local Government and Provincial Councils, and the Ministry of Megapolis and Western Development are responsible for administration of local government activities. The Ministry of Lands is responsible for administration of land related matters in all areas except in estates, where lands are under the purview of the Ministry of Plantation Industries. Welfare of estate communities is the responsibility of Ministry of Hill Country New Villages, Infrastructure, and Community Development, and the Regional Plantation Companies (RPCs). Enforcement of land use planning and building regulations is the responsibility of the Urban Development Authority in areas under the purview of Municipalities, Urban Councils and areas declared by the Urban Development Authority, while Pradeshiya Sabhas are responsible for the enforcement of building codes in rural areas. Regulations of the House and Town Improvement Ordinance govern the building codes, supplemented by regulations developed by the Pradeshiya Sabhas. Building codes have not been widely applied to construction in the estate sector, however NBRO approvals are required for any construction in areas above 305m (1,000ft) above sea level and other landslide prone locations, which include the majority of estates.

National Natural Disaster Insurance Scheme

The National Insurance Trust Fund (NITF) under the purview of the Ministry of Finance in collaboration with NDRSC of Ministry of Disaster Management initiated a state funded National Natural Disaster Insurance Policy (NNDIP), which came into effect from April 1, 2016. This covers structural damages of each housing unit up to LKR 2.5 million, providing access to all the citizens of the country within the policy limits. The property damages will be assessed as per the improved property damage assessment according to NBRO criteria by NDRSC officers. The funds for construction will be released in instalments after monitoring/ certification of each stage by the respective technical and non-technical officials at DS level.

Post-disaster Effects

Destruction of infrastructure & Assets

58,925 housing units across 25 districts were affected by floods, landslides and heavy rain and strong winds from the hydro-meteorological disaster of May 2016,[16] and this is illustrated below in Figure 10. 6,382 houses were fully damaged, 25,958 houses were partially damaged, and 26,585 houses suffered minor damage. This amounts to 1.15% of the total housing stock of the country.[17] The total damage in full house equivalents[18] is over 52% of the annual demand of 50,000 housing units.[19]

Over 50% of the houses affected by the disaster were in the Colombo district. It is estimated that considerable number of the affected houses in urban areas of Colombo and Gampaha districts were either located in government owned reservations of the Sri Lanka Land Reclamation and Development Corporation and of the Irrigation Department, or flood prone low lying buffer zones of water bodies as per surveys carried out by UN-Habitat.

Kolonnawa DS division, which suffered the greatest damage, has a high density of informal settlements with unauthorised improvised and semi-permanent housing on reservations and buffer zones of the Kelani River basin. The remaining houses are mostly privately owned. The residents of damaged houses are either low-income households employed in Colombo or those engaged in informal occupations, in addition to new migrants to the urban areas. Low-income boarders (lodger/renting a room in another's house) in informal employment and employed in factories and commercial establishments in the city and industrial zones were also affected by the destruction of housing although the number affected has not been quantified.

The Ad hoc development of informal settlements in these urban areas, while affecting the communities living in these areas, also caused a secondary effect due to the reduction of the capacity of secondary and tertiary canals of the Kelani River basin. This and the reclamation of water retention areas, thereby increased the intensity and duration of the urban floods, with negative impacts on other neighbouring settlements.

The damage in rural areas was proportionally lower when compared to the urban sector. It is estimated that all affected houses were privately owned, as renting is extremely rare in rural areas of Sri Lanka. 1,862 houses in the estate sector were affected by landslides. All affected houses in the estate sector are below 46.4515m^2 [20] in extent and of semi-permanent construction. Tenure in estates is related to employment, and the families live rent-free in these poor quality semi-permanent houses commonly known as line rooms.

The prolonged duration of flooding and poor early warning systems resulted in almost total loss of household assets of the affected households as these households could not move their household assets to safe locations. Although no data was available on the damage to household assets, estimates based on asset ownership and on housing typology and size of the damaged and destroyed households indicate damages of LKR 11.738 billion.[21] This figure could be considerably higher as there has not been any data on the total number of undamaged households who lost their assets.

16 *Source: NDRSC Incident Summary report-Flood and Landslide on May 2016*

17 *The total housing stock of Sri Lanka is units 5,144,145 as per the 2012 census*

18 *Full house equivalent of minor damage-25%, partial damage-50%, fully damaged-100%*

19 *National Housing Policy, Western Region Megapolis Planning Project*

20 *Equal to 500ft^2*

21 *See Sector Assessment Methodology for details on calculation methodology*

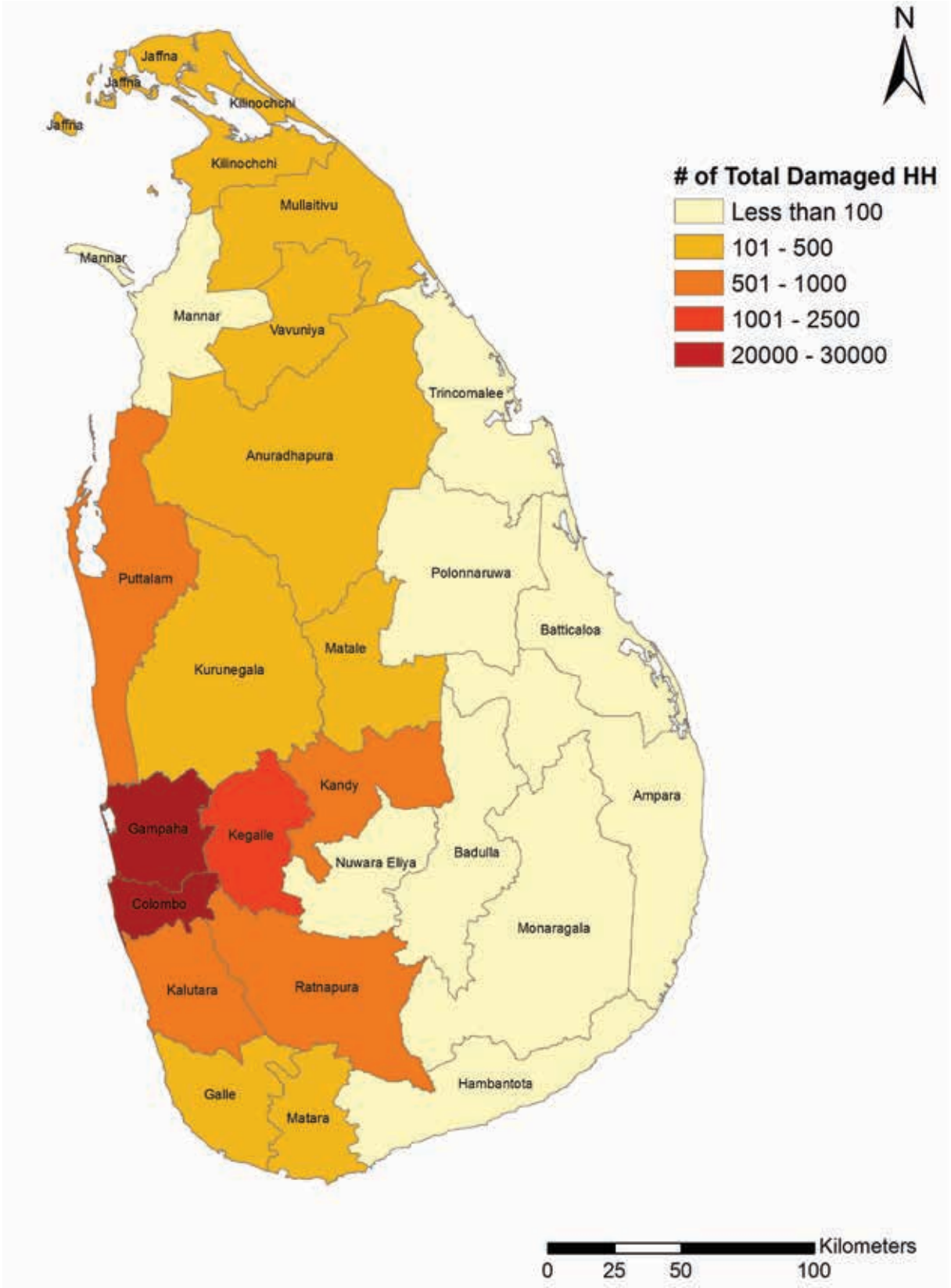


Figure 10. Distribution of affected houses due to floods and landslides. Source: NDRSC and NBRO.

Effects and disruption of service delivery and production of goods and services

Displacement of population except in certain locations in Kegalle, Ratnapura and one location in Colombo District was short-term. However the displacement was more prolonged than annual floods, which resulted in logistical needs that communities could not handle on their own. Displaced communities stated that their traditional safe locations were no-longer safe due to the severity of the disaster. In addition lack of marked evacuation routes was also a challenge faced by communities, especially new settlers in urban and peri-urban areas, non-permanent residents, and communities affected by landslides.[22] Unfamiliarity of rescue teams about local terrain in urban and peri-urban areas and non-availability of rescue equipment such as small boats with local communities hindered evacuation to safe areas in parts of Gampaha district.[23]

Considerable damage to production of building materials such as clay bricks and tiles and cement blocks by SMEs in Colombo, Puttalam, and Gampaha districts may cause medium term shortages in the supply and result in price escalations.[24] Supply of sand, earth, and rubble for construction was also disrupted due to the physical effects of the disaster. Therefore it is expected that there may be significant impacts on the housing construction in short and medium term.

Effects and disruption of sector governance functions and systems

The Divisional Secretaries in the most severely affected areas did not have the capacity to respond to immediate needs, due to lack of access to the most affected areas, their own staff being affected and lack of surge capacity.[25] Therefore local communities themselves acted to establish early safe locations in public places immediately after the disaster and were subsequently supported by the military, NGOs and the Sri Lanka Red Cross.

The demand for flood debris clearance in urban and peri-urban areas was greatly in excess of what could be handled by the respective local authorities. In Colombo and Gampaha districts local authorities supplemented by the military and Civil Security Department conducted community clean up facilities in common areas of affected settlements. The government released a grant of LKR 150 million for the task, while over 1,200 persons were deployed.[26] However canals and drains still remained blocked by debris in affected urban areas, and some debris created by landslides remain to be cleared, at the time of this assessment. There were also residual needs for debris clearance in individual plots in urban and peri-urban areas of Colombo and Gampaha districts.[27]

Increased and emerging risks and vulnerabilities

Houses inundated by flood waters for 2-3 weeks, may have been structurally weakened, although not visibly damaged by the disasters, which may result in future damage from disasters of much lower intensity in the future. Similarly buildings in high landslide risk areas although not damaged by the current disaster may be damaged by landslides caused by a lesser degree of precipitation. Therefore special attention needs to be paid to signs of damage with future rains and the North East monsoon in particular. Immediate housing repair needs may force people to use low quality materials especially in informal settlements in the urban and peri-urban areas, which may result in highly vulnerable houses. There is also the risk of affected low and middle income households being trapped by unsustainable debt to repair houses, replace lost household assets, and recommence home based micro-enterprises. Communities stated that

22 Source: Mission reports

23 Source: Focus Group Discussions in Kolonnawa and Gampaha

24 Source: Field visit notes and field observations

25 Source: Field visit notes

26 Source: Ministry of Disaster Management

27 Source: UN-Habitat assessments

micro-credit organisations started visiting affected communities soon after the communities returned from displacement.[28]

Summary of Damages and Losses

		Type of Housing	Area (m^2)	Number of houses	Estimated value (LKR million)
Damages	Fully damaged	Improvised Housing	<46.4515	1,555	281
			46.4515≤x<92.903	2	1
		Semi-Permanent Housing	<46.4515	2,209	963
			46.4515≤x<92.903	307	606
		Permanent Housing	46.4515≤x<92.903	2,043	5,680
			≤ 92.903	266	980
	Partially damaged	Improvised Housing	<46.4515	237	21
			46.4515≤x<92.903	130	25
		Semi-Permanent Housing	<46.4515	8,936	1,948
			46.4515≤x<92.903	9,010	8,886
		Permanent Housing	46.4515≤x<92.903	5,363	7,454
			≤ 92.903	2,282	4,205
	Minor damage	Improvised Housing	<46.4515	3,997	181
			46.4515≤x<92.903	175	17
		Semi-Permanent Housing	<46.4515	4,660	508
			46.4515≤x<92.903	5,217	2,573
		Permanent Housing	46.4515≤x<92.903	7,923	5,506
			≤ 92.903	4,613	4,250
	Household goods				11,738
	Damage total				**55,822**
Loss	Cost of environmental/debris cleaning				168
	Temporary shelter provision				19
	Cost of safe location management				45
	Cash grant for evacuated persons				24
	Loss Total				**256**
Effect Total (Damage +Loss)					**56,078**

Table 17. Housing, Land and Settlements damages and losses.

28 *Source: Focus Group Discussions Kolonnawa*

Impact Analysis on Development Goals

Economic impact

The total damage to housing is equivalent to around 52 percent of the annual number of houses constructed.[29] It is expected that all housing repairs will be completed in the next year while around 827 fully damaged houses may be reconstructed in-situ in the rural areas. Similarly a further 827 houses are expected to be completed in-situ during the second year. Reconstruction of 27,650 houses may require between two to ten years to complete due to the need for relocation into safe locations. The increased demand for housing will have some impact on the balance of payments of the nation as around 75 percent of cement and around 10 percent of timber for construction is imported. The short and medium term impacts on locally produced building material such as clay bricks and tiles, cement blocks and locally extracted river sand, earth, and metal stones may result in shortages and resultant price escalation of material costs. Skilled and unskilled construction labour is in high demand, and any further increase in demand could result in labour price increases. This may have high impacts on reconstruction costs in urban areas significantly.

In addition to the impact of the disaster on housing stock of the country, over 11,000 houses identified as situated in high landslide risk areas have been planned to be relocated to low risk locations.[30] It is also recommended that all houses in low lying GoSL reservations and buffer zones need to be relocated into higher ground to ensure minimum future damage to housing and assets, while re-establishing the drainage patterns and water retention areas in the Kelani River basin[31] to minimise disaster impacts on the economic, industrial and commercial hubs of Colombo and Gampaha Districts. Addressing these unmet development needs may have a considerable economic impact.

Human impact

Although numbers of renters and boarders are not known, they were some of the worst affected by the disaster as they were not part of the support networks of permanent residents, and were not registered under permanent residence, and thereby did not have access to relief assistance. Unaccompanied women boarders employed in the Industrial Estates were particularly vulnerable in this context, but there have not been reports of any incidents involving harassment or abuse. Therefore it is required that renters and boarders be eligible to receive assistance to replace their assets, although housing reconstruction support may be provided to the owners of the houses. New settlers in urban and peri-urban areas who had unknowingly settled in low lying areas were vulnerable as they had still not established support networks and were unfamiliar on how to respond to floods.

Conflicts between the host community and persons displaced by landslides in Kegalle was reported in the media, as the displaced community was occupying the host community's school. Host families and displaced persons living with them also lacked access to relief assistance. This had considerable impact on the household economies of the host families.

29 The annual national production of new houses is around 50,000 units as per the Central Bank Annual Report of 2015.

30 Source: National Building Research Organisation

31 Source: Department of Irrigation, Sri Lanka Land Reclamation and Development Corporation

Cross-cutting Issues

Disaster Risk Reduction

Most houses affected by the disaster were constructed in high-risk areas unsuitable for human habitation. In addition ad hoc land use patterns which increased disaster risk, through disruption of natural flows of water and reclamation of water retention areas in the Kelani River basin, and unsustainable agricultural practices in landslide prone areas aggravated risks. Poor quality construction was the main reason for housing damage in urban areas as over 65 percent of the affected houses were improvised or semi-permanent constructions. Poor early warning systems, lack of flood modelling systems which could predict the inundation patterns and poor community capacities to respond to the disaster also contributed to the impacts.

Although the Disaster Management Act of 2005 has specified measures to respond to and mitigate disasters the lack of capacities for enforcement may be quoted as the main reason for the magnitude of the impacts in the housing sector. In addition, the extent of damage in the sector can be attributed to un-planned development in urban areas contravening the Urban Development Authority regulations in urban areas, and construction contravening NBRO and Pradeshiya Sabha regulations and the Housing and Town Improvement Ordinance Regulations in other areas.

Environment

Illegal reclamation of water retention areas together with reduced capacity of secondary and tertiary canals resulted in severe and prolonged flooding in urban and peri-urban areas. The urban flood, while impacting on the vulnerable informal settlements, also increased the severity and duration of the flood on peripheral low vulnerability areas, as reclamation of water retention areas for housing resulted in reducing the capacities of secondary and tertiary canals. River bank erosion was another causal factor. This was cited by communities as a reason for housing damage in Kolonnawa DS division and was also observed during the field visit to Dompe DS division. The river erosion was attributed to sand mining.

Gender, age and diversity

Provision of adequate privacy to conduct household activities for men, women, and children in safe locations was of concern.[32] Particular attention needs to be paid to Female headed households (FHHs) and economic, social and protection needs of these households. One reason for the reluctance for families with elderly and disabled to evacuate to safe locations was the lack of accessibility for disabled and elderly; as well as the lack of and quality of water and sanitation facilities. Establishment of safe locations with marked evacuation routes, adequate privacy, access to adequate water and sanitation facilities and accessibility for persons with disabilities is essential. Establishment of a women and children's desk and raising awareness on protection issues in safe locations may help to prevent occurrence of child abuse or gender based violence in safe locations.

In the long term, ensuring equal access to ownership for women is a pre-requisite for post disaster land tenure restitution. Although there is no legal barrier to joint ownership of land, this has not been implemented in any post disaster reconstruction programmes. The Estate Housing Policy of 2016 has pioneered specifying joint ownership of new houses provided to households in the estate sector, which needs to be expanded to other land grant programmes. It is also essential to provide safe and affordable accommodation for female garment industry workers to reduce their vulnerability in general, and during and after disasters in particular.

32 Source: Field mission reports.

Recovery and Reconstruction Strategy

Global frameworks guiding reconstruction

The recovery and reconstruction strategy for housing, land and settlements should focus on reducing risk and increasing resilience of affected communities through construction of safe and affordable housing incorporating disaster mitigation measures, settlement and land use planning conforming to planning regulations and guidelines and incorporating affected communities' social, cultural and economic needs. The reconstruction strategy is guided by the following global development frameworks:

- Goal 11 of the Sustainable Development Goals.
- New Urban Agenda 2030.
- The Sendai Framework for Global Disaster Risk Reduction 2015-2030.
- Build Back Better principles.

Early Recovery Strategies

In the short term the recovery strategy proposed focuses on the discontinuation of safe locations to ensure that some normalcy returns to the lives of affected persons. This will be achieved through construction of transitional shelters in land identified for permanent housing or through provision of a rent allowance to rent a house of the family's choice.

Reconstruction strategies at national and local level

Urban areas

Over 75 percent of the affected houses are located in Colombo and Gampaha districts-the main industrial and economic hub of the country. The Western Region Megapolis Planning Project guides the future development housing and settlements in the urban and peri-urban areas of these districts. The reconstruction strategy aligns with National Housing Policy, which focuses on provision of affordable social housing for low-income households in under-served urban settlements. Development of settlements in these areas should be as per the regulations of the Urban Development Authority and the building codes of the respective local authorities. In addition to addressing immediate housing needs created by prolonged urban flooding in Colombo and Gampaha districts, it is important to address the issue of unauthorised development of low-income under-served settlements in the reservations and buffer zones of the Department of Irrigation and of the Sri Lanka Land Reclamation and Development Corporation in the Kelani River basin. Re-establishing the natural storm water drainage system and restoring the water retention areas, secondary and tertiary canals, which have deteriorated due to ad hoc physical planning in these areas, is vital to mitigate future urban floods which have been increasing in frequency and severity, as well as mitigate potential floods that could be caused by climate change induced sea level rise. This is vital to ensuring the continuity of the commercial, industrial and economic hub of the country.

Landslide-affected areas

Landslides caused severe damage to households in the Central and Uva Provinces. Kegalle District suffered the most damage, and the NBRO has identified 1,682 housing units to be relocated as a result of the disaster. 2,361 houses have been identified for relocation due to landslides island-wide. The majority of landslide affected housing and settlements are in the estate sector. Any reconstruction in landslide-affected areas should conform to the circular on construction clearance from NBRO dated 10 Feb 2011. Physical plans for relocation settlements in landslide prone districts, and construction of houses and infrastructure should be approved by NBRO as per the above circular. Any reconstruction in estates should be guided by the National Plan of Action 2016-2020 and the Estate Housing Policy 2016. Estate settlements should follow a township concept as per the above guidelines. The Ministry of Hill Country New Villages, Infrastructure, and Community Development will provide legal land tenure documentation for the affected households, in

collaboration with the Ministry of Plantation Industries. Expediting relocation of these households is key to minimizing the impact on the national economy, due to disruptions to economic activity in the estate sector.

Rural Areas

In rural areas, the damage to housing stock was relatively low. It is important for any reconstruction in rural areas to be regulated by the Housing and Town Improvement Ordinance and the building codes of the respective Pradeshiya Sabhas in addition the relevant regulations and development plans governing the particular land use and location. Reconstruction in most rural areas will be done in-situ unless the sites were high-risk sites.

Guidelines for reconstruction

Community consultation and participation

Community consultation is the key to any housing reconstruction programme as it raises awareness of affected communities about their entitlements, choices for reconstruction and most of all ensuring ownership of the reconstruction process. Although communities and households may not construct houses themselves, ensuring their participation in the decision making process ensures greater satisfaction, ownership of the outputs by the communities, and thereby ensuring the sustainability of the reconstruction process. Communities need to be mobilised to participate in decision making regarding the choice of location, planning of settlements, design and estimation for housing and managing financial entitlements.

In-situ reconstruction through owner driven housing methodology

Expediting compensation payment through the National Insurance Policy to households who are able to repair and reconstruct houses in-situ through adoption of the owner driven housing methodology, with technical support from GoSL or other implementation agencies; as well as close monitoring of construction quality to incorporate structural disaster mitigation measures is vital to re-establishing a sense of normalcy in the lives of affected communities. In-situ reconstruction may be completed within one year of payment of compensation in the best-case scenario or within two years in the worst-case scenario. Nearly 200,000 houses were reconstructed after the 2004 Tsunami and the end of the conflict in the North and East through the owner driven methodology. In addition to this approach being time and cost effective, researchers have shown that homeowners adopting this process have a greater sense of satisfaction and ownership.[33]

Relocation

Relocation with its economic and social implications may not be the ideal reconstruction strategy in post disaster situations, however considering that many of the affected houses are in restricted and high risk zones, relocation may be the only option to reduce future disaster risk not only for affected persons but also for neighbouring communities; as well as to protect key economic assets in urban areas and the estates. While the key to sustainable reconstruction is community consultation throughout the process, the relocation process has five options:

Voluntary relocation: Voluntary relocation is the process, where affected households are offered the choice of relocating to a land of their choice located in a safe location, with financial grants provided to purchase land. This coupled with compensation through the insurance scheme or through housing reconstruction grants for owner driven housing construction together with technical support and regular monitoring will ensure a sustainable solution for affected families. This approach has been successfully implemented in the post tsunami reconstruction programmes, where families from the coastal belt in Colombo district have voluntarily relocated to safer locations inland.

33 Barenstein, J., 2012, The role of communities in post-disaster reconstruction. A call for owner-driven approaches.

Government facilitated relocation to green field sites: it is likely that this methodology will also be adopted to assist the majority of the affected households in urban areas and those affected by landslides in estates. Community participation throughout the relocation and reconstruction process is vital to successful outcomes and will ensure sustainability.

Several approaches may be adopted to reconstruction of houses in relocation sites, the most preferred being ***owner driven reconstruction*** wherever the communities are willing and have the capacities to implement this approach. The second preferred option is the ***community driven approach*** which engages local community based organisations through community contracts to reconstruct houses. This approach while injecting cash to the local economy will also enhance community cohesion.

Construction through the military or contractors may be less preferable. However this might be the only option where technological expertise beyond the capacities of the households and communities is required for construction. The military has proven to be cost effective and efficient resource for time sensitive reconstruction such as Meeriyabedda. However they may require support in liaison and mobilizing communities. Contractors are least preferred option as they are the most costly entity that could be engaged. The contractor driven approach has failed in post tsunami and post conflict reconstruction programmes due to time, cost, and construction quality issues, and non-involvement of beneficiaries in the reconstruction process.

Enforcement of legislation

Enforcement of environmental and land use planning legislation and policies is key to ensuring the sustainability of reconstruction interventions. As most of the affected urban and peri-urban areas are within government owned reservations and buffer zones, enforcement of relevant legislation after relocation of these communities is vital to re-establishing natural water flows and water retention areas. The Western Region Megapolis Plan has designated these areas as Eco Zone 2, which includes establishment of 60m buffer zones on either side of the Rivers and 100m buffer zones around other inland water bodies such as tanks, lakes, and lagoons. The eco-zones on government owned land should be no-build zones, and may be converted into parks, nature reserves and other recreational areas to ensure their sustainability, while such areas on private owned land in peri-urban areas should be released for permitted agricultural activities. The local authorities are responsible for enforcement of legislations as per the Western Regional Megapolis Plan, and the necessary policy, legislative and institutional changes are required together with enhancing the capacities of the respective local government authorities to make enforcement effective.

No-build zones should be established in high landslide risk areas, although sustainable agricultural activities and agro-forestry may be permitted as affected communities have economic and emotional ties to these lands.

Capacity building

Technical capacities of all stakeholders involved in disaster risk mitigation is vital to implementation of a successful reconstruction strategy and enforcement of regulations. Mainstreaming disaster risk reduction in all technical curricula is the long term strategy, while training and awareness programmes at all levels should be conducted in the short term for stakeholders involved in the reconstruction process. Mainstreaming disaster risk reduction in the construction industry is important to ensure disaster resilient housing. Disaster risk reduction and structural mitigation measures should be included in civil engineering, architectural, physical planning and technical curricula at all levels including construction tradespersons' curricula. In addition continuing professional development courses for construction industry professionals and short certification programmes for traditional construction artisans and builders need to be provided to mainstream disaster resilient construction methods. Capacities of local governments and other regulatory

bodies should be built to ensure that buildings are constructed conforming to the relevant building codes of disaster prone areas.

Entitlements

Ensuring equitable compensation and support is vital to prevent conflict within and between communities. Minimum construction standards, as established in the post tsunami and post conflict reconstruction programmes need to be established together with structural guidelines. Construction of new houses of 50m^2 (550ft^2) is recommended to ensure equity with other social housing programmes being currently implemented nationwide. It is important to enforce the house per house replacement principle implemented in the post tsunami reconstruction programmes to prevent the whole reconstruction process growing out of proportion with additional extended and new families requesting assistance. A positive bias towards prioritising FHHs, persons with disabilities and other vulnerable persons is proposed through a weighted scoring system such as that implemented under the Indian Housing Project in the North and East.

Improved access to sustainable housing finance options

Post disaster housing reconstruction programmes in Sri Lanka have been cited as a cause for creating unsustainable debt among beneficiaries. While many beneficiaries have been able to complete houses, with the given grant, beneficiary aspirations to build a bigger and better house, together with the lack of opportunities for diversified sustainable livelihood has been the root cause of indebtedness.[34] The available options for housing finance generally cater for middle-income and upper middle-income families, and vulnerable families with little collateral and informal sources of income do not qualify for these loans. Therefore many of them borrow from local moneylenders and micro-finance organisations at high interest rates. Therefore it is recommended that concessionary loan schemes for affected households in collaboration with the Housing Development Finance Corporation, State Mortgage and Investment Bank and National Housing Development Authority be established to supplement insurance payments.

34 *Romeshun, K., Gunasekara, V. and Munas, M, 2013. Life and Debt: Assessing Indebtedness and Socio-economic Conditions of Conflict Affected Housing Beneficiaries in Jaffna, Kilinochchi and Mullaitivu Districts.*

Recovery and Reconstruction Needs with Costs

		Unit	Cost (LKR million)
Short term	Environmental cleaning	LKR 0.2 mx150GN	30
	Camp care and maintenance	LKR 400x615HHx180days	44
	NFI assistance	LKR 0.003mx250,000HH	75
	Cash grant	LKR 25x615HHx180days	95
	Subtotal		**244**
Medium term	Construction of transitional shelters	LKR 0.15mx1,922 units	288
	Demolition and debris removal for in-situ new house construction	LKR 0.02mx1,654 units	33
	Minor repairs to housing	22,406 units	14,563
	Repair of partially damaged houses	7,215 units	9,632
	50% of new house reconstruction in-situ	827 units	1,647
	Technical and monitoring support for medium term in-situ reconstruction	10% of #7,8 &9	2,584
	Subtotal		**28,748**
Long term	50% of in-situ new house reconstruction	827 units	1,647
	Technical and monitoring support for 50% of in-situ new house construction	10% of #11	165
	Relocation cost for 2,361 households in landslide affected areas in Kegalle and estates	2,361 units	5,891
	Technical and monitoring support for reclocation of landslide affected	10% of #13	589
	Cost of relocation of urban flood affected communities in Colombo and Gampaha districts	25,289 units	77,354
	Technical and monitoring support for reclocation of urban flood affected	10% of #16	7,735
	Capacity building in DRR for construction industry		70
	Establishing institutional frameworks for enforcement of land use planning regulations		50
	Subtotal		**93,501**
Total			**122,493**

Table 18. Housing, Land and Settlements recovery and reconstruction needs.

Implementation Strategy for Recovery

As detailed in the “Governance” section of the Pre-disaster Context and Baseline, there are a large number of stakeholders and authorities involved with the housing, land and settlements sector.

This section will focus mainly on the implementation of the housing reconstruction strategy, as it is the main component of sector recovery. The reconstruction will be aimed at supporting 58,925 households whose houses were affected by floods and landslides. The recovery and reconstruction costs for the sector are much higher than the cost of physical damage and losses, due to the need for relocation of low value improvised and semi-permanent housing in the urban areas of Colombo and Gampaha with permanent housing units with disaster mitigation measures incorporated. Although only 6,382 housing units in total were fully damaged by the disaster nearly 30,000 units need to be replaced to mitigate the impacts of future disasters for affected households and also the commercial, economic and industrial hubs in the Colombo District and the plantations in the estate sector. The reconstruction cost includes the cost of land for relocation at market prices and land preparation costs inclusive of disaster mitigation measures. The following context specific approaches to reconstruction are recommended as per affected location:

- In-situ repair and reconstruction of 29,621 minor and partially damaged housing units and 1,654 fully damaged housing units (including replacement for minor damaged and partially damaged improvised housing) in low-risk areas-the reconstruction cost for in-situ reconstruction is estimated at LKR 27.5 billion. This will be financed mainly through compensation from the Natural Disaster Insurance Policy of GoSL and may be supplemented through concessionary loans.
- Relocation of 2,361 houses affected by landslides inclusive of 1,682 units in Kegalle District, and the Estate sector (1,862 units inclusive of those included in the Kegalle District) to low landslide risk areas: The reconstruction cost for relocation of landslide affected households is estimated at LKR 5.8 billion, inclusive of the cost of land, settlement planning and land preparation, and house construction. This may be partially financed by compensation from the insurance policy, financed by GoSL and possible donor funding.
- Relocation of 25,289 flood affected housing units located in reservations and buffer zones of the Kelani River basin in urban and peri-urban areas of Colombo and Gampaha Districts: The cost of reconstruction in relocated sites is estimated at LKR 77 billion, which is equivalent to 70% of the total housing reconstruction cost. This may be addressed through long-term Development Programmes of GoSL such as the Western Region Megapolis Plan, which includes relocation of informal settlements, and establishment and enforcement of eco-zones along the Kelani River basin. Although the popular choice in urban areas for relocation has been construction of high-rise buildings, it has not been accepted as a sustainable solution by the relocated communities due to high service charges for maintenance of services and social issues. Therefore it is recommended that medium and low rise developments maintaining the same densities be planned incorporating the social, economic and cultural needs of the relocated communities.

Sector Assessment Methodology

The assessment of damage, loss and needs has been conducted based on the available data, field mission interviews, the market price and the best possible assumptions at the time of reporting. The used data and the calculation methods are given below:

Estimation of damage to housing

Detailed data on housing damage provided by NDRSC as at August 1, 2016 was used except for the Colombo district. As it was not possible to gather a complete data collection due to the scale of the damage, the numbers were estimated based on field observations after the disaster, understanding of the housing conditions of the affected areas prior to the disasters and total numbers from Incident Summary Report-flood & landslide in May 2016 and separate survey results both done by NDRSC.

The size in each housing type was unified (between the upper and lower thresholds[35]) for calculation purposes, and this is detailed below in Table 19.

The damage was classified as minor-less than 25 percent, partial-25-50 percent, and fully damaged-not-repairable or between 50-100 percent with the consensus of the MDM and NDRSC officials. The rates for damage calculation were provided by NBRO.

The housing damage was calculated by the following equation: the rate (LKR million)*degree of damage (minor, partial or fully) = total damage (LKR million). The table below is the full rate for each housing type and size applied for calculation.

35 *For less than 46.4515m^2 : (Max size 46.3586m^2 + Minimum liveable size 18.5806m^2)/2 = 32.5161m^2*
For houses at or above 46.4515 m^2 and below 92.903 m^2: (Max size 92.8101m^2 + Minimum 46.4515m^2)/2 = 69.6773m^2
For houses above 92.903m2: 92.903m^2 as not possible to assume the max and the bigger houses are robust

Type	Size range (m^2)	Rate/m^2 (LKR)	Size used for calculation (m^2)	Bathroom (LKR)	TOTAL (LKR)
Improvised Housing	<46.4515	4,951.40	32.52	20,000	181,000
	46.4515≤x<92.903	5,166.68	69.78	20,000	380,000
Semi-Permanent Housing	<46.4515	12,486.14	32.52	30,000	436,000
	46.4515≤x<92.903	27,878.54	69.78	30,000	1,972,500
Permanent Housing	46.4515≤x<92.903	38,965.37	69.78	65,000	2,780,000
	≤ 92.903	38,965.37	92.90	65,000	3,685,000

Table 19. Housing rate (LKR).

Household goods calculation

As data for household goods was not available and the expenditure on durable household goods was shown only by the urban, estate and rural sectors not the income groups or housing typology and sizes, the household assets were calculated based on the value and assumption of the type of assets available by housing size and type. It was assumed that all the assets were damaged due to influx of water or debris even in minor damaged houses; therefore 100 percent of the asset value was applied for all affected houses. As there was no data on asset loss in undamaged houses, the estimates are assumed to be conservative. A detailed breakdown of the asset value calculation is given in Annex 7. Housing, Land and Settlements.

Type of Housing	Area (m^2)	Asset Value Estimate (LKR)
Improvised Housing	<46.4515	15,000
	46.4515≤x<92.903	45,000
Semi-Permanent Housing	<46.4515	75,000
	46.4515≤x<92.903	130,000
Permanent Housing	46.4515≤x<92.903	325,000
	≤ 92.903	500,000

Table 20. Asset per housing types and sizes (LKR).

Estimation of Losses

Cost of environmental cleaning/debris clearance : At the point of assessment, environmental and debris cleaning was mainly done in Colombo and Gampaha districts. The provided fund from the national government was LKR 150 million for both districts in total. The loss includes the cost for the personnel who engaged in cleaning activity: LKR 1,500 per person per day x 1,200 staff x 10 days. The distribution between Colombo and Gampaha is made at the ratio of the affected people.

Temporary shelter : Most of the temporary shelter provided was tents donated by the international communities. The total number of tents supplied was 2,435 according to NDRSC's Humanitarian Assistance to Flood and Landslide Disaster Situation, Foreign Donations as at July 22, 2016. Out of these tents, NDRSC reported the actual number distributed to 7 districts totalling to 1,479. The difference has been built into the Colombo district number assuming they are in stock. The average cost of the tent is LKR 7,000.

Safe location management : The cost was calculated using the construction cost of temporary toilet, communal cooking areas, and miscellaneous cost including provision of water through water storage systems or bowsers.

Cash grants : The cash grant of LKR 225 per person per day is provided to the evacuated people by GoSL. The grant is received by the DS who buys necessary food items and distributes to the people in the safer locations in Kegalle district. The number of persons is based on the number of persons remaining in the safety centres as at July 25, 2016 from Incident Summary Report-flood & landslides on May 2016.

Rental loss : Collection of data on renters was not possible during this assessment and considering that the percentage of rented housing is generally low as per the 2012 Census,[36] rental loss was not considered for calculation of losses.

Estimation of Needs

Short term needs

Environmental cleaning : According to UN-Habitat field survey, 150 severely affected GN divisions in Western Province are still in need of environmental cleaning. The estimated average cost for each GN is LKR 200,000.

Camp care and management : It is estimated that 575 households in Kegalle district and 40 households in Colombo district will need to be accommodated in the safer locations for the next 180 days. The maintenance cost is estimated at LKR 400 per household per day.

Non Food Items (NFI) assistance : There are unaddressed needs in Colombo and Gampaha district for NFI from UN-Habitat field survey. It is estimated that 25,000 household will need the items at the rate of LKR 3,000 per household.

Medium term needs

Construction of transitional shelters : 1,922 households in total (1,682 in Kegalle, 240 in Colombo and Gampaha) require transitional shelters. The rate is taken at LKR 150,000 per shelter.

Demolition and debris removal for in-situ new house construction : The estimation of LKR 20,000 per household for demolition and debris cleaning in their lands is needed for 1,654 units of in-situ new housing construction.

Housing reconstruction (Medium and Long term)

The following assumptions and estimations formed the basis of calculating housing reconstruction needs.

1. All improvised houses are proposed to be replaced with permanent houses in conformity with BBB principles.
2. The repair and reconstruction cost to housing was calculated on the unit rate for permanent housing provided by NBRO.
3. All affected improvised houses, partially and fully damaged semi-permanent houses and fully damaged permanent houses in the Colombo and Gampaha Districts are assumed to be in high-risk areas and proposed to be relocated.
4. It is assumed that 20% of the caseload to be relocated will opt for voluntary relocation except in the estate sector, where relocation is closely linked with employment.
5. The cost of land is conservatively estimated at LKR 1,000,000 per housing unit in Colombo District, LKR 800,000 in Gampaha District and LKR 400,000 in other areas.
6. A land preparation cost of LKR 50,000 per housing unit to be relocated is estimated for Colombo and Gampaha Districts, while a cost of LKR 120,000 is estimated for landslide affected areas as per the estimates of the Indian Housing Project in Central and Uva Province.

36 Department of Census and Statistics, 2012, Census of Population and Housing 2012.

Health and Nutrition

Executive Summary

During the May 2016 floods and landslides, health was one of the sectors that suffered damages and losses, with a total damage estimate of LK R478.5 million (of which the insured assets account for about LKR 468.5 million) and losses of LKR 118.7 million. The damages and losses in the health sector were therefore limited.

Based on the build back better concepts, and respecting the components of the Safe Hospitals Initiative, the health sector estimates recovery and reconstruction needs of LKR 1.0326 billion.

Pre-disaster Context and Baseline

The Ministry of Health, representing the government health sector, is one of the technical partners in the disaster management coordination framework in Sri Lanka. The MoH, being present at the National Council for Disaster Management, is also a key member of the National Disaster Management Coordination Committee. The Ministry of Health, keeping in line with the developments in the National Disaster Management Framework, has set-up a coordination mechanism within itself. This coordination mechanism becomes critical, especially in the context that Health is (administratively) a fully devolved subject in Sri Lanka. The Central Line Ministry of Sri Lanka established the Disaster Preparedness and Response Division (DPRD) as the focal unit for all health emergency/disaster coordination work. The DPRD, headed by the National Coordinator, operates through a network of Focal Points appointed in Line Ministry Hospitals, Provincial and Regional Directorates and Line Ministry programmes.

The government health sector is one of the technical partners in the disaster management coordination framework in Sri Lanka. Being represented at the National Council for Disaster Management by the Minister of Health, it is also a key member of the National Disaster Management Coordination Committee. The Ministry of Health, keeping in line with the developments in the National Disaster Management Framework, has set-up a coordination mechanism within the Ministry. This coordination mechanism becomes critical especially in the context that Health is, administratively, a fully devolved subject in Sri Lanka. The Central Line Ministry of Sri Lanka established the Disaster Preparedness and Response Division (DPRD) as the focal unit for all health emergency/disaster coordination work. The DPRD, headed by the National Coordinator operates through a network of Focal Points appointed in Line Ministry Hospitals, Provincial and Regional Directorates and Line Ministry programmes.

The medical service provision during emergencies is coordinated through the hospital network, exceeding 1,000 in number, while the public health service provision is coordinated through the public health programmes and the Offices of the Medical Officer of Health (MOH). In the hospital network, over 300 are tertiary and secondary care hospitals providing specialised services. In emergency situations, these hospitals are mainly responsible for providing health staff for deployment. The hospitals at the primary level are responsible for the provision of outpatient and first level referral services in emergency/disaster situations. Medical supplies for deployment are primarily provided by the Medical Supplies Division (MSD) of the MoH, which is responsible for the provision of all medical supplies to both the curative and public health sector institutions within the MoH. As the operation during emergencies becomes a critical lifesaving act, the storage capacities of the MSD also become a vital issue. The MSD has several stores within the Colombo district and 26 regional stores which house urgent and day-to-day requirements as well as buffer stocks for several months. Due to the large requirements, the MSD, in addition to the main store complexes of the MoH has also rented several sub-stores.

The public health service is provided through the Medical Officer of Health Divisions and this arm of the health sector is critical in providing this service in the field during emergencies. The Medical Officer of Health Office has field staff, mainly the Public Health Inspector (PHI) (for every 10,000 population) and the Public Health Midwife (PHM) (for every 3,000 population). The Public Health Midwives run a Maternal and Child Health (MCH) Clinic for every 3,000 population and there is an extensive network of MCH clinics in the country. Under the supervision of the Medical Officer of Health, the PHIs and PHMs play a coordinating role with health and other partners in the field, to assure public health services are provided in emergencies.

The DPRD leads the preparedness and response of the health sector in emergencies, coordinating closely with the focal point network described above. During the preparedness phase, the DPRD pays much attention on carrying out capacity building activities including training, conduction of drills/simulations, provision of supplies and materials and the development of guidelines and Standard Operating Procedures. Monitoring and evaluation of all preparedness and response activities is also carried out by the DPRD on a regular basis. Through the National Disaster Management Coordination Committee, the DPRD liaises closely with all other sectors in preparedness and response activities.

Number of hospitals	**Number**
Tertiary care	120
Secondary care	209
Primary care	475
Number of Medical officer of Health Divisions	339
Health manpower	
Consultants/Medical Officers	18,643
Nursing Officers	31,859
Public Health Midwives	9,024
Public Health Inspectors	1,690

Table 21. Basic health sector data. Source: Ministry of Health

Maternal Mortality Ratio	32/100,000
Neonatal Mortality Ratio	3.8/1,000
Nutrition	
Stunting	10.5
Wasting	12.2
Reported cases of Dengue	
Total cases 2015	29,777
Reported cases till 30 April 2016	16,603

Table 22. Selected health indicators. Source: Ministry of Health.

Military Medical Services

The military medial services are organised under the Ministry of Defence as the Sri Lanka Army, Navy and Air Force Medical Services. These services have their own medical staff and also have individual hospital and medical supply chain management systems. The Sri Lanka Army, having a larger force, plays a significant role in medical service provision to survivors, coordinating with the Ministry of Health in emergencies. The Army Medical Service is organised in five units as Army Medical Corps 1-5, which respond in emergencies across the country. The capacity of the personnel to mobilise immediately and their ability to access the hard to reach areas in an evolving emergency scenario, has been key in reducing human loss in emergencies in the past.

Sri Lanka has a rapidly expanding private health sector and the sector is regulated by the Private Health Sector Regulatory Council (PHSRC), comprising of all stakeholders and convened by the Director/Private Health Sector Care Services of the Ministry of Health. There are currently over 217 private health institutions practicing allopathic medicine registered under the PHSRC.

Post-disaster Effects

In May 2016, with the emergency situation, health was one of the sectors affected directly and indirectly. In response, the coordination mechanism detailed above was in full operation. The sector's response was spearheaded by the MoH in all the affected districts. The Sri Lanka Army Medical Service coordinated with the MoH in deploying health staff and medical supplies to provide lifesaving medical care to the survivors in the field, especially in the hard to reach areas.

Damages

A total of ten healthcare institutions of the Ministry of Health, Nutrition and Indigenous Medicine were directly affected in five districts, namely Colombo, Ratnapura, Kegalle, Puttalam and Kilinochchi. The institutions included, Maternal and Child Health Clinics (7), MOH Central Clinics (1), a PHM quarters (1) and a drug store of the Medical Supplies Division (1). The Medical Supply Division's Sub Stores, which was affected, was a warehouse rented from a private owner in the district of Colombo. Though these ten institutions were directly affected there was no significant structural damage to the health institutions.

When damages to assets were considered, the Medical Supplies Division reported damages as the stores were directly affected. Damages to medical supplies, as well as to two vehicles were reported, however all had the necessary insurance cover.

None of the health institutions of the Ministry of Defence were directly affected by floods/landslides, nor were any damages to structures and assets reported.

According to the Director/Private Health Care Services, none of the private health institutions reported any significant damage or loss to the PHSRC.

Losses

Operational costs: Due to the intensive response operation carried out over the first four weeks, a considerable operational cost was incurred by the health sector of the government. This was mainly by the Ministry of Health and also the Ministry of Defence. The Ministry of Health deployed over 50 medical teams on a daily basis to safe locations established for survivors for over four weeks starting from May 16, 2016, mainly in the districts of Colombo, Gampaha and Kegalle. Each team comprised of medical officers and nursing officers and was provided with a standard pack of medical supplies with the necessary medicines. In addition, the Ministry of Health deployed a Forensic Medical Team to Kegalle to manage the mass fatality incident. Every safe location included a health post, which coordinated all medical and public health services with either a Public Health Midwife or a Public Health Inspector in-charge to ensure best possible public healthcare provision. In addition, special teams were deployed for mental health service provision to the worst affected districts. The Public Health teams deployed to the safe locations ensured continued maternal and child healthcare service provision.

The Army medical teams also comprised medical officers and nursing officers equipped with medical supplies in the stated three districts. The deployment was mainly from May 16 to 29, 2016 to address immediate lifesaving medical relief needs.

During the operation, the costs incurred were mainly in relation to staff, drugs and transport of medical teams. In addition, the Emergency Operations Centre of the DPRD functioned 24/7 for four weeks commencing 15 May 2016. The operational cost was calculated based on the validated data and best estimates from the response units. The operational cost of the DPRD, MoH was mainly borne by the National Health Development Fund of the MoH.

Increased risks and vulnerabilities

Sri Lanka, with a strict surveillance system in place, did not report any disease outbreaks following the floods. However, the reporting of Dengue cases increased by over a 1,000 in June from the number reported in May 2016. The main hospital providing inpatient services to Dengue patients, especially in the flood affected areas, would be the National Institute for Infectious Diseases (NIID), in Sri Lanka. The following table gives a clear picture on the increase of admissions from dengue to the NIID following the floods.

Month	Number of admissions of suspected dengue patients
April	276
May	302
June	1020

Table 23. Number of admissions of suspected dengue patients. Source: NIID, 2016.

Due to this increased risk, the Ministry of Health stepped up dengue mosquito control activities and fogging was adopted as one of the strategies for vector control. Therefore, the high risk of dengue created as an additional risk following the floods, meant having to purchase a large number of fogging machines, which added to the additional cost for the Ministry Health.

Loss of revenue

The government health service is free at the point of delivery. Hence there was no concern on loss of income for the government during the period of the emergency due to disruption of services. In addition, the private health institutions did not report of any losses to the PHSRC.

Effects on sector governance, functions and systems

The Ministry of Health and the Ministry of Defence responded using the emergency management systems laid down and there was no effect on the functioning of the system and sector governance.

Summary of Damages and Losses

	Damages (LKR)	Losses (LKR)
Ministry of Health	478,500,000*	115,018,000
Sri Lanka Army Medical Service	0	3,664,285
Total	478,500,000	118,682,285

Table 24. Health damages and losses.

* Insured assets worth 468,500,000 LKR of the MSD, MOH

Find a detailed table of damages and losses of the MoH and of the operational costs of the Sri Lanka Army Medical Service in Annex 8. Health Sector.

Impact Analysis on Development Goals

There was no significant impact on the development goals of the sector. The emergency situation was for a few weeks only and hence there was no significant impact on any related health indicators.

Cross-cutting Issues

The country's health sector has been strengthened over the years adopting the principles of Disaster Risk Reduction. Mitigation, prevention and preparedness is the basis of the strategic guidelines developed which are also in line with international and national frameworks for DRR.

Sri Lankan context lays much weight in prioritising the healthcare needs of women and children. With this regard, the basic components of Sexual and Reproductive Health in Emergencies were well observed by all healthcare providers in the field and institutions. Maternal and Child Health Clinics were conducted even in the safe locations for the displaced mothers and children assuring an uninterrupted MCH service. The MoH adopts a policy decision to admit all pregnant mothers over 36 weeks POA as well as high-risk mothers. Going a step further, due to the nature of the emergency, the MoH decided to admit all pregnant mothers to hospitals this time, to ensure best possible maternal care during the displacement. Child welfare activities, including immunisations were carried out in the safe locations as well as adjacent PHM areas by the Medical officers of Health and Public Health Midwives.

Recovery and Reconstruction Strategy

The recovery needs of the sector was based giving due consideration to disaster risk reduction and management as well as on the 'Build Back Better' concept. The needs of the Ministry of Health are mainly on retrofitting and repairing some of the vulnerable institutions while that of the Army Medical Service was mainly on preparedness and strengthening the response capacity.

One of the main components of the Ministry of Health is strengthening the medical supply chain and in this regard there is a requirement for the relocation of the sub-store that was affected, which is a privately-owned warehouse, rented by the MoH. This would be the largest reconstruction need in monetary terms.

One of the critical structures that needs urgent attention and is important to be included in the reconstruction strategy is the District Chest Clinic of Kegalle. Situated at a high-risk geographic location, the premises needs to be relocated/retrofitted based on assessments of experts, as stressed by the Regional Director of Health Services Kegalle.

Sri Lanka adopted the Safe Hospitals Initiative in 2013. The MoH is in the process of addressing the structural, non-structural and functional safety components of healthcare institutions in an organised manner, assuring that the health units will remain operational in emergencies especially in these high-risk areas. Hence, the different aspects of the safe hospitals initiative are considered in developing the recovery and reconstruction strategy for the health sector in the high-risk areas for floods/landslides.

The Sri Lanka Army, being organised in five Army Medical Corp divisions, requires the capacity to respond immediately. Hence respecting the principle of preparedness in DRR, the need is to prepare the divisions, strengthening their response capacity. The army medical response was sought during the critical period from May 16 to 29 when access was a challenge to the MoH. These medical teams were responsible for providing the immediate lifesaving medical care to the survivors in the most affected and risky areas, especially in the most critical first few hours to days, when the disaster was still evolving. Strengthening their capacity for immediate deployment is critical to minimise the human cost in any emergency in the future.

Recovery and Reconstruction Needs with Costs

Institutions	Number	Short term (LKR million)	Medium term (LKR million)	Long term (LKR million)
Construction of a Medical Supplies Stores-Colombo	1		500	
Central MOH Clinics (Retrofitting/renovation)	18	51.5		
Primary medical Care Units (Retrofitting/renovation)	8	21.8		
MCH Clinics (Retrofitting/renovation)	39	90		
Divisional Hospitals (Retrofitting/renovation)	6	25.5		
PHM Quarters	1	3		
Strengthening Transport Facilities			12	
Kolonnawa (central clinic) Wellampitiya CD premises				30
District Chest Clinic-Kegalle				110
Total		**191.8**	**512**	**140**

Table 25. Recovery costs Ministry of Health.

A detailed cost breakdown of the MSD is given in Annex 8. Health Sector.

Item	Number	Short term (LKR million)	Medium term (LKR million)	Long term (LKR million)
Ambulances (4WD)	10	113		
Mobile hospitals (including facilities for minor surgeries and conducting rapid lab tests)	5		21	
Fiberglass boats with an out boat motor (casualty evacuation)	10	4		
Mobile radiology facilities (x-ray and USS)	5		50.8	
Total		**117**	**71.8**	**-**

Table 26. Recovery costs Sri Lanka Army Medical Service.

Short term	Medium Term	Long term	Total (LKR million)
308.8	583.8	140	1,032.6

Table 27. Health recovery and reconstruction needs.

Implementation Strategy for Recovery

The Ministry of Health would implement the recovery activities through the line ministry and provincial and regional directorates of health services that are administratively responsible for the health service delivery. The DPRD, being the focal unit for all emergency related activities, would be the main focal unit of the entire exercise. The logistics department of the MoH has the technical personnel to repair/retrofit and build the required structures for the MoH.

Within the Sri Lanka Army, the Directorate of Army medical Services would be the focal unit as the administrative authority. The Sri Lanka Army has necessary technical capability to implement their recovery needs.

Sector Assessment Methodology

The sector assessment was initially conducted by the Disaster Preparedness and Response Division of the Ministry of Health and the Medical Service of the Sri Lanka Army. The numbers were validated by the respective directorates of each Ministry based on the current market values and estimates.

Education

Executive Summary

The PDNA for the education sector is a joint exercise of the Government and development partners, and has been led by the Ministry of Education (MOE) with the assistance of UNICEF.

The assessment covers pre-schools and general school education (grades 1-12). Pre-school education was affected in the districts of Colombo, Gampaha, Kurunegala, Kegalle, Ratnapura and Mullaitivu districts. The general education sector suffered damages and losses in Colombo, Gampaha, Kalutara, Puttalam, Kegalle and Ratnapura districts. Anuradhapura did not record significant damages and losses in either area. The chapter provides estimates of the recovery and reconstruction needs using the principle of 'Building Back Better'. The damages and losses for the sector are calculated based on the data and information provided by the MoE, Provincial Education Offices and pre-school authorities in the affected areas. UNICEF supported the MOE in this exercise, including gathering relevant information from district education offices to supplement the data provided by the MOE.

The net value of the total damages and losses to the education sector is estimated at LKR 623.69 million at pre-disaster prices. Of this, the damage to infrastructure and physical assets is estimated at LKR 507.08 million. Overall, the public sector suffered more in terms of damages and losses when compared to the private sector. More specifically, of the total impact, 98 percent accrues to the public sector and only 2 percent to the assessed private sector.

The total recovery and reconstruction needs for the education sector for the next three years (Fiscal Years 2017-2019) using the principle of Building Back Better is estimated at LKR 413.12 million. The recovery strategies and specific short, medium and long-term needs are described in the main text.

Pre-disaster Context and Baseline

Education System

Sri Lanka has around 17,023 Early Childhood Care and Development (ECCD) centres with 29,341 teachers, catering to 475,617 children aged between three and five years. Around 84 percent of these centres are either under private management or run by NGOs and other non-government entities. On average, ECCD centres are resource constrained and inadequate in terms of teaching/learning materials, classroom arrangement, and teacher qualifications. In particular, the centres have limited materials and equipment for indoor use, and are clearly deficient in terms of the provision of facilities for children with special needs.

General education in Sri Lanka is delivered in four stages; the first two stages of education, lasting nine years, comprise basic education. Primary education is the first stage of general education and lasts for five years (grades 1-5 for children aged 5-10). At the end of grade 5, there is an examination, the Grade 5 Scholarship Examination, which the majority of children sit for. The results are used to provide modest bursaries for poorer children to enter the schools most in-demand. The second stage is junior secondary school, grades 6-9 for children aged 11-14, for which there is automatic promotion. Post-basic education begins with upper secondary school, covering grades 10-11 for children aged 15-16. This includes the General Certificate Examination (GCE) Ordinary level, which is the end point of secondary education. The educational needs of out-of-school children are addressed through Non Formal Education (NFE) programmes. There is a NFE branch in the Ministry of Education (MoE), which focuses on the needs of disadvantaged groups in society, such as out-of-school children and non-literate adults.

The majority of children (93 percent) attend government schools. In 2015, there were 10,144 schools. The majority of them were state funded, 98 were privately-funded and 743 were Pirivena schools, which are mainly for Buddhist monks. There are two national languages and English is coined as a link language; accordingly, the medium of instruction can be Sinhala or Tamil and for a small minority English (1.4 percent). Schools are classified according to type based on the terminal grade in the school and the courses offered. There are four types of schools classified as follows:

- **Type 1AB :** Senior secondary schools with classes from grades 1-13 or 6-13 offering GCE Ordinary Level and Advanced Level subjects in the Arts, Commerce and Science streams.
- **Type 1C :** Senior secondary schools with grades 1-13 or 6-13 offering GCE Ordinary Level and GCE Advanced Level subjects in the Arts and Commerce streams.
- **Type 2 :** Secondary schools with classes from grade 1-11 or 6-11 offering GCE Ordinary Level.
- **Type 3 :** Primary schools from grades 1-5, occasionally a grade span of 1-8.

Almost all schools offer primary education (96 percent), and only Type 3 schools are self-contained primary schools. There are 3,877 of this type, which tend to be small and concentrated in the rural provinces. There are more than 230,000 teachers employed by the Government and majority of teachers are professionally qualified. All schools provide male and female students and teachers with access to improved water and sanitation facilities segregated by sex in-line with the standard ratios and norms of the country.

Education Financing

The country has a population of 4.1 million school children (grades 1 to 13), representing nearly 20 percent of the total population. However, the expenditure on education as a share of the total government expenditure declined rapidly from 11 percent in 2006 to 9 percent in 2011. The total government expenditure on education as a proportion of GDP also declined from 2.7 percent in 2006 to 1.7 percent in 2012 (UIS UNESCO, 2015). This is the smallest share of public investment in education among the countries in the region and lower-middle-income countries. Of this funding, 32 percent is for primary education and 50 percent for secondary education, reflecting the fact that primary education has never had a high priority (World Bank, 2013). The allocations are used mainly for recurrent expenditures such as salaries (75 percent) and only 20 percent on quality. However, following the Presidential Election in January 2015, the Finance Minister of the National Unity Government stated, during the interim budget speech, that "the government will introduce initiatives to increase educational spending gradually to a more desirable level in order to reach the expected 6 percent of the GDP". Household expenditure on education is significant in Sri Lanka. The percentage distribution of average monthly household expenditure on education in 2009/2010 was 5.6 percent.[37] Due to the high cost on families, children from lower income quintiles are more likely to drop out.

Access to Education

In Sri Lanka, the enrolment rate for Early Childhood Education (ECE) (children aged between 3-5 years) has increased in recent years; however, a significant percentage of children in this age group still do not participate in ECE programmes. In primary and lower secondary education,[38] Sri Lanka has achieved close to universal participation. The primary education net enrolment rate (2012) is 93.8 percent with gender parity[39] and the survival rate to Grade 5 is 97.39 percent, with boys (96.86 percent) trailing slightly behind girls (97.93 percent). Net enrolment at secondary level (2012) is lower at 85.4 percent (87.5 girls and 83.4 percent boys). The percentage of out of school children at primary level is low, estimated at 1.9 percent; 1.9 percent male and 1.8 percent female.[40] This amounts to an estimation of 103,178 children out of primary

37 *Source: Central Bank Sri Lanka, 2011*

38 *Department of Census and Statistics, 2013, Household Income and Expenditure Survey 2012/13.*

39 *Source: UIS UNESCO, 2015*

school. Children of primary age who are out of school are more likely to be from the estate sector than rural or urban areas,[41] and are as likely to be girls or boys from poorer families.

Equity

Striking disparities across regions are evident in terms of school facilities, teacher composition and quality of service delivery, but research studies have not been undertaken to assess these and provide robust quantitative and qualitative data. Rural secondary schools, particularly in remote areas, have difficulty in attracting qualified teachers. There are striking disparities between provinces in learning outcomes. According to the NEREC study on the achievement of learning outcomes of grade 4 students in 2013, the overall performance in First language differs according to the two languages. The all island mean value for the Sinhala language is 64.56. Disparity in achievement prevails with approximately 15.3 percent of students scoring below 40 and 20 percent of students scoring between 80-89 marks. The all-island mean value for the Tamil language at national level is 58.28. Disparity in achievement prevails with approximately 30 percent of students scoring below 40 and 17 percent of students scoring between 80-89 marks. When the achievement in mathematics is considered, the national level mean is 60.32. Disparity in achievement prevails with approximately 20 percent of students scoring below 40 and 40 percent of students scoring above 70.

The Central and Uva Provinces are also low performers due to a large tea estate population, identified as one of the most disadvantaged population groups in terms of poverty and social development indicators, including education. Seven plantation districts are spread across three provinces (namely, Central, Uva and Sabaragamuwa) in the middle part of the country. Around 230,000 families, 900,000 people, live on tea estates in these provinces representing five percent of the total population. According to the HIES 2009/10, the estate sector has the highest poverty head count index (11.4 percent) compared to urban (5.3 percent) and rural (9.4 percent) areas. Low educational attainment in these provinces is highly associated with the higher incidence of poverty.

Post-disaster Effects

This section describes the effect of damages and losses resulting from the flooding and landslides on the education sector.

Effects on Infrastructure and Physical Assets

During the May 2016 floods and landslides, 140 pre-schools were affected. Out of these 73 pre-schools were damaged in Colombo, Gampaha, Kegalle, Ratnapura, Kurunegala and Mullaitivu districts affecting 3,500 students. The damage to preschool buildings, furniture, learning materials, stationery and utensils were estimated at LKR 18.4 mil.

A total of 173 schools in six districts were also damaged to varying degrees out of a total of 2,850 schools in the Western, North Western and Sabaragamuwa Provinces. While some schools incurred substantial damages to their physical infrastructure, other schools experienced only minor infrastructure damage and damages to assets and equipment. Out of the total damaged schools, 120 are located in the Western Province, primarily in the districts of Colombo (63 out of total 406 schools), Gampaha (38 out of total 536 schools) and Kalutara (19 out of total 417 schools). In Sabaragamuwa Province, 34 schools were damaged: 32 schools in Kegalle district (out of 533 schools) and 2 schools in Ratnapura district (out of 592 schools). Another 18 (out of 366 schools) were damaged in Puttalam district in the North Western Province.

40 Source: UNICEF, 2013

41 Source: UNICEF, 2013

District	Total number of schools	Total number of damaged schools
Colombo	406 (106 rural)	63
Gampaha	536 (449 rural)	38
Kalutara	417 (371 rural)	19
Kegalle	533 (522 rural)	32
Ratnapura	592 (544 rural)	02
Puttalam	366 (339 rural)	18

Table 28. Proportion of damaged schools by district. Source: Ministry of Education.

The damages and losses reported to the Ministry of Education indicate that one school had 22 fully damaged classrooms, while the remainder 172 schools had 766 damaged classrooms between them, including partial damage to roofing, walls, flooring, electrical wiring, drainage systems and playground areas. In addition, 34 of these schools reported damages to the water and sanitation facilities. Furniture and equipment, particularly computers, computer tables, lab equipment etc., were also damaged during the flooding. Children lost stationery, textbooks, shoes, school bags and uniforms.

In addition to damaged schools, the NBRO has recommended the relocation of five schools in Sabaragamuwa Province, including Dehiowita Tamil Maha Vidyalayam (555 students), Atulugamwela Primary Vidyalaya (60 students), Elangapiitya Primary Vidyalaya (12 students), Elangapiitya Siripura Primary Vidyalaya (23 students) and Wathura Primary Vidyalaya (63 students), due to their location in high risk areas for landslides. In Kalutara district of the Western Provice, three schools have to be relocated for similar reasons.

	Pre Schools	School Classrooms	Total
No. of classrooms/rooms fully destroyed	0	22	22
Estimated value of damage (in Million LKR)	0.0	28.0	28
Number of classrooms/rooms partially destroyed	72	766	838
Estimated value of damage (in Million LKR)	7.3	350.5	358
Number of toilets and wash facilities	18	34	52
Estimated value of damage (in Million LKR)	7.2	5.9	13
Number of compound walls	0	21	21
Estimated value of damage (in Million LKR)	0	15.0	15
Equipment (in Million LKR)	0.57	23.5	24
Furniture (in Million LKR)	1.5	17.6	19
Other assets (textbooks, education materials, uniforms)	1.8	66.6	68
Total	**18.4**	**507.1**	**525.5**

Table 29. Estimation of damage to infrastructure and physical assets. Source: Ministry of Education and PDNA team.

District	Amount (LKR Million)
Kegalle	148.50
Ratnapura	6.10
Colombo	118.30
Gampaha	130.60
Kalutara	54.40
Puttalam	49.18
Total	**507.08**

Table 30. District-wise estimation of damage to infrastructure and physical assets of government schools. Source: PDNA team and Ministry of Education.

Colombo district recorded the highest damage to infrastructure and physical assets of government schools followed by Kegalle and Gampaha district respectively.

Effects on production of goods and services and access to services

The districts that suffered the most disruption to education service delivery included Kegalle and Ratnapura in the Sabaragamuwa Province and Colombo and Gampaha in the Western Province. Other more severely affected districts included Kalutara and Puttalam.[42]

Majority of the schools in the Sabaragamuwa Province could not function for three days from 18-23 May 2016. In addition, 32 schools in Dehiowita, Mawanella, Kegalle and Ratnapura areas were used as centres to house those displaced. In the majority of these 32 schools, displaced persons lived in the schools from May 18 to June 13, 2016, which disrupted schooling for 18 instructional days. A total of 2,600 children (1,271 boys and 1,329 girls) were amongst those displaced for a period ranging from one to four weeks. The five schools in the Sabaragamuwa Province recommended for relocation, commenced classes in an alternative location for their student population of 713 after two weeks of being closed.

In the Western Province, schools in the flood affected areas of Kolonnawa, Kelaniya and Kaduwela did not function for a period of one to three weeks until flood waters receded and the cleaning of the school premises were completed. In addition, 20 schools were used to house displaced persons for three to four weeks. A total of 627 (310 boys and 317 girls) children are currently living in transitional centres in the province until they can be permanently resettled. Authorities have admitted these children into nearby schools so that they can continue their education with minimum disruption.

Effects on sector governance functions and systems

No major damages were reported to Government offices, including education administration structures.

Increased risks and vulnerabilities

Prior to the disaster, the NBRO had declared that many schools in Sabaragamuwa Province (Ratnapura and Kegalle districts) are located in high-risk landslide areas and in need of urgent relocation. Therefore, these schools should follow a phased approach and relocate education services given the existing risk of landslides in the area. However, until permanent solutions are reached for the relocation of these schools, including the identification of an alternate and safe land area and resources for school construction, many children are continuing to attend these schools despite the risks involved.

42 *Education services are administered through education zones instead of districts. These zones are usually smaller units than the districts, however the mapping of zones to districts is not many to one.*

In addition, 52 schools were used as temporary evacuation centres from May 15 for 2-3 weeks in severely disaster-affected districts. During this period, students of these schools, irrespective of whether they were directly affected by the disaster or not, lost almost a month of schooling. Currently, those who continue to be displaced in the Kegalle district due to the landslides are housed in temporary camps with support from the Government and humanitarian agencies, thereby avoiding any disruption to schooling and education services.

Children have been affected in different ways by the floods and landslides in each district. It has been reported that in the Kegalle district, 22 children (9 girls and 13 boys) were killed during the landslide disaster, four children lost both parents and seven lost their fathers, who, in most cases, were the breadwinners of the families. Others lost relatives, neighbours or friends. In all affected districts, children have suffered from damages to their shelter, loss of family livelihood/income and disruptions in schooling. In addition, many displaced families had to endure multiple displacement within a two-month period in both rural and urban areas due to various reasons, including shifting between safety centres and movement within relatives houses. This has taken an emotional toll on children who may now need a strong support network and psychosocial support if they are to recover and have a sense of normalcy in their lives.

Summary of Damages and Losses

The net value of the total damages and losses to the education sector is estimated at LKR 623.69 million at pre-disaster prices. Of this, the damage to infrastructure and physical assets is estimated at LKR 507.08 million

Overall, the public sector suffered more in terms of damages and losses when compared to the private sector. More specifically, of the total impact, 98 percent accrues to the public sector and only 2 percent to the private sector.

	Disaster Effect			Distribution by Ownership	
Subsector components	Damages	Losses	Total	Public	Private
Pre-schools	18.4	1.89	20.29	8	12.29
School (1-12 grades)	507.10	96.30	603.4	603.40	0.00
Total (LKR million)	525.50	98.19	623.69	611.40	12.29

Table 31. Education damages and losses (LKR million).

Impact Analysis on Development Goals

The disaster has caused loss of life or injuries and has left many families in an extremely difficult situation with inadequate or a complete lack of shelter, limited livelihood opportunities and disrupted schooling. For most children living in such conditions, a return to schooling provides the only semblance of normalcy in their lives. However, while some were able to return to schools that were not or only partially damaged, others could not, particularly in cases where the school was significantly damaged or used to house displaced persons. This meant a significant disruption to their education and for many having to attend another school in the area. At a time when children have suffered so many losses, the new and unfamiliar environment is an added source of stress. Most affected children lost schooling materials, as well as their uniforms and shoes, which resulted in many children not being sent to school even in cases where they could return. The children living in displacement centres have the added difficulty of a lack of privacy and space to study or do homework as well as transportation difficulties in accessing the school.

The overall impact of the disaster on the development goals of the sector can be seen in the very low school attendance rates during the early post-disaster period. In addition, many children reported that it was difficult to concentrate on their studies given the stressful situation they are living in while facing an uncertain future. This situation is further exacerbated for older students as they have lost educational materials, including class notes for students facing G.C.E. Ordinary Level and Advanced Level examinations in 2016, which could detrimentally impact the performance of these students in the examinations.

Cross-cutting Issues

It is evident that the majority of the affected schools located in flood prone areas did not have or were unable to implement school safety plans as part of their disaster risk reduction strategies to minimise the damage and loss caused by recurrent flooding. School safety planning also empowers the school community, particularly the students, to be actively engaged in discussions around disaster risks and mitigation measures, as well as how to stay safe both in their school and also in their homes. The reports that children, particularly adolescents, felt disengaged in the response and recovery process and uncertain about their future meant that such school safety and disaster risk reduction discussions had not taken place in their schools or community.

The disaster could also have an impact on the education of both boys and girls in the estate sector, based on the fact that children in these areas are already more at-risk of dropping out of primary school, compared to other parts of the country, due to issues of poverty and high household expenditure on education. Due to high cost on families as a result of the disaster, children, particularly girls, from lower income quintiles could drop out of schools to support alternative livelihoods. It is therefore recommended to monitor school enrolment rates in districts that were affected by the disaster and have a large estate sector. Additional measures, such as alternative livelihoods for parents and school feeding programmes could be effective in mitigating school dropouts. In addition, mothers living in transitional camps reported difficulties finding transportation to take their children to school and for other classes that are located in their former village. In some cases, the distance between the camp and their former village means that children have to take several buses to get to school or have to walk in the dark through unfamiliar areas. This poses protection risks and many mothers expressed these concerns to the assessment team, particularly for their young daughters.

Recovery and Reconstruction Strategy

The overall focus of the recovery and reconstruction strategy in the education sector is to ensure uninterrupted education service delivery at all times where children are able to receive quality education in a safe environment.

Priority recovery and reconstruction needs

This section describes the short, medium and long-term priority recovery and reconstruction needs with an estimate of resources required to build back better from a multi-hazards perspective. The estimation of needs covers the entire sector and includes the needs of the private sector as well.

Subsector	Cost of Needs (LKR million)
Pre-schools	39.58
School Sector	336.19
General Governance and Administration	37.35
Total	**413.12**

Table 32. Education recovery and reconstruction needs.

It is estimated that the education sector recovery plan would require LKR 413.12 million to implement the planned activities in the short, medium and long term basis as explained below.

Short term needs (2016)

These include the immediate needs that are required to resume the delivery of education services until reconstruction and rehabilitation of permanent structures is completed.

Both in the pre-schools and Government schools, the short-term needs include:

- Resumption of education services, ensuring that all affected students have access to quality education in pre-schools and government schools.
- Provision of uniforms, textbooks and teaching-learning materials based on a survey of affected schools identifying gaps in this area.
- Repair of WASH facilities in affected schools to ensure that all affected boys and girls have access to safe drinking water and sanitation facilities enabling them to attend schools regularly.
- Provision for replacement of lost equipment: furniture, computers, lab equipment and library books etc.
- Provision of psychosocial support to affected children and their families in schools and at community level to help them cope with the stressful situation and equip them with the skills they need to be resilient and start rebuilding their lives.

Medium term needs (2017)

Medium term needs will be dominated by the reconstruction of damaged buildings and allied services. This will require reviewing and revising existing legal and oversight mechanisms for strengthening and ensuring safety in all types of educational facilities.

- Reconstruction of partially damaged school buildings after assessing the needs of relevant school buildings, including safety and disaster risk reduction features, and replacing lost assets.
- Continuous provision of psychosocial support to affected children and their families in schools and at community level to help them cope with the stressful situation and equip them with the skills they need to be resilient and start rebuilding their lives.
- Review of existing curriculum and textbooks with DRR and resilience principles and approaches and promotion of DRR related action-oriented project work for primary, secondary and Advanced Level students.
- Strengthening of disaster preparedness and response processes at the school and community level through school/community based Disaster Risk Management (DRM) training and planning. Schools will be encouraged to develop emergency response plans.

Long term needs (2018-2020)

This phase will focus on long term development issues, particularly in developing a nation-wide policy and implementation plan for education safety across the country. Adequate policies and measures will be put in place to carry out multi-hazard preparedness of education institutions and investing in making buildings resilient to different kinds of disasters. In the long term, all education institutions will be built on the principle of ‘build back better’ in-line with the international best practice of school safety.

- Construction of schools recommended for relocation and those fully damaged using principles of ‘building back better’ including disaster resilience technology, better learning environments and quality services.

- Improvement of existing policies, guidelines and systems for better safety and DRR in schools.
- Undertake school vulnerability mapping for all types of hazards and develop a central database or link it with existing EMIS system.
- Develop an emergency response mechanism at MOE along with a national data base to track damages and loss in case of an emergency.
- Use the data from vulnerability mapping and prepare a report to determine cases in which existing school site needs relocating to safer location. The assessment should capture the school's exposure to hazards such as floods, landslides, wind-storms, avalanches and rock falls, etc.
- Continue to strengthen disaster preparedness and response processes at the school and community level through school/community-based DRM training and planning. Schools will be encouraged to develop emergency response plans.

Recovery and Reconstruction Needs with Costs

	Assumptions/Comments	Short Term (2016)	Medium Term (2017)	Long Term (2018-2020)
Short term needs (2016)				
Provision of uniforms, textbooks and teaching-learning materials	All the affected students have been provided with necessary textbooks, uniforms, stationery and school bags by now. However, further gaps in provision will be fulfilled on a priority basis	14.75		
Repair of WASH facilities in affected schools	Rehabilitation of WASH facilities in 34 schools	25.80		
Provision for replacement of lost equipment, furniture, computers, lab equipment and library books etc.	Replacement of damaged furniture, equipment and learning materials such as computers. computer tables and chairs, science lab equipment, musical equipment, sports materials and library books	25.70		
Provide psychosocial support to affected students and families	Teachers and school development committee/ pre-school management committee members should be trained on best practice in psychosocial support for affected children and their parents; an action plan is drawn and implemented at 175 schools and 140 affected pre-schools	4.83		
Medium term needs (2017)				
Reconstruction of partially damaged school buildings	1 school is fully damaged and 174 schools have been partially damaged (10-25%)		169.50	
Continue to provide psychosocial support	Provision of one to one sessions, group sessions along with community activities. 2 focal points to facilitate activities in 6 most affected districts		1.44	
Review of existing curriculum and textbooks with DRR and resilience perspective	A local consultant should be engaged to review and make recommendations		1.20	
Promote DRR related outdoor action oriented project work for primary, secondary and A/L students	Related materials: teachers guide, story books, and posters will be developed to facilitate this process		7.71	
Strengthen disaster preparedness and response at the school and community level through school-based/community based DRM training and planning	Capacity building workshops at provincial, zonal and divisional level.		7.74	

Long term needs (2018 onwards)				
Construction of schools recommended for relocation and fully damaged schools.	Construction of new schools, subject to Government policy decision			61.00
Improving existing policies, guidelines and systems for better safety and DRR preparedness in schools.	Recommend a consultancy and workshops to review existing schools' safety guidelines and provide recommendation to conform to international standards			2.60
Undertake school vulnerability mapping for all types of hazards and develop a central data base or link it with existing EMIS system	The assistance of NBRO will be sought for technical support to undertake venerability mapping for all schools			52.31
Develop an emergency response mechanism at MOE along with a national data base to track damages and loss in case of an emergency	This will link to the data base mentioned above with data collections tools along with roles and responsibility for emergency focal points and a reporting mechanism.			2.09
Using the vulnerability mapping, prepare a report to determine cases in which existing school site needs relocating to safer location.	The assistance of NBRO will be sought for technical support to compile a report on vulnerable schools, which require durable solution.			0.90
Continue to strengthen disaster preparedness and response at the school and community level through school-based/community based DRM training and planning.	Support schools to undertake School Self-Assessment and School planning incorporating DRR. One day workshop at schools by zonal emergency focal points			35.56
Total	**In million LKR**	**71.08**	**187.59**	**154.45**

Table 33. Recovery and reconstruction plan for the education sector including pre-schools

Implementation Strategy for Recovery

The Ministry of Education (MOE) will implement the planned activities using its own resources in collaboration with UN agencies, NGOs and Community Organisations.

The MOE has already provided immediate assistance to affected schools and students by providing textbooks, stationery items, uniforms and school bags to ensure an uninterrupted service in education. The MOE will continue to collaborate with organisations such as UNICEF, Save the Children and other agencies in implementing activities focusing on school safety and child-centred DRR in schools.

The Ministry of Education will continue to promote participatory school self-assessment and planning processes with emphasis on the Child-Friendly Approach, including Disaster Risk Reduction (DRR) and Social Cohesion, with support from UNICEF. This will include mainstreaming of DRR by its inclusion as a mandatory subject in the secondary school curriculum and building capacities in school safety and DRR planning.

The priority of the Ministry of Education is in ensuring that the children affected by the disaster in Kegalle and Ratnapura districts have access to primary and secondary learning opportunities by supporting repair/ renovation of 22 damaged schools, including replacement of damaged furniture, equipment, and water and sanitation facilities; support to catch-up education programmes to enable children to return to and stay

in school and capacity building on child-centred DRR and preparation of school safety plans for disaster affected schools, with UNICEF support.

Additionally, the Ministry of Women and Children's Affairs and UNICEF are working towards supporting 77 affected pre-schools to help them recover through the replacement of damaged furniture, equipment, play material and books; provision of ECCD kits for 131 pre-schools; and capacity building of care givers and health staff on early childhood care and development for children under five years of age. This ensures that children aged 2-5 years old affected by the disaster have access to pre-primary learning opportunities and that caregivers and relevant authorities have the necessary skills and knowledge to promote the care and development of children under five years in Kegalle, Ratnapura, Colombo and Gampaha districts.

Sector Assessment Methodology

Data for this assessment was gathered through available sources from the Ministry of Education, the department and zonal directors of education from Sabragamuwa, Western and North Western Provinces. UNICEF supported the MOE in the needs assessment and UNICEF officers visited affected schools, met with education officers, principals, students and parents to gather relevant information.

Sector Reports

Productive Sectors

Food Security, Agriculture, Livestock, Fisheries

Executive Summary

The floods and landslides that occurred in May 2016 caused a large number of displacements, damage to productive assets, loss of livelihoods, and reduced agricultural, livestock, fishery and aquaculture production. The highest damage is attributed to the small-scale irrigation facilities. This is due to the collapse of small-scale dams, destruction of drainage systems and blockage of irrigation channels. Replacement and restoration of small-scale irrigation infrastructure before the next major plantation season (Maha 2016/17) is identified as one of the priority reconstruction and recovery needs to avoid further production losses.

The total damages reported after the floods are LKR 1,698.05 million, while the total losses correspond to LKR 1,901.75 million. The highest loss was reported due to loss of the harvest of other field crops (OFCs), mainly consisting in groundnut, green chilli, green gram, big onion, maize, black gram, cowpea.

The recovery needs are estimated at LKR 2.4115 billion. Approximately, LKR 400 million is required to address the short-term recovery needs, whilst over 80 percent of the other needs identified correspond to medium and long term, and sum to LKR 2.016 billion. With the aim of improving resilience among the small-scale vulnerable farmers, the costs have been calculated using the 'Building Back Better' approach. The Building Back Better approach promotes flood resistant varieties of crops, inter-cropping and crop-diversification.

Pre-disaster Context and Baseline

Sri Lanka has achieved significant improvement in its socio-economic status during the last decade. The country achieved a middle-income status in 2010 and has seen a decline in the national poverty head count ratio from 13.2 percent in 2009 to 6.7 percent in 2013. However, frequent natural disasters (i.e. floods, landslides and dry periods) impact agricultural production, especially seasonal farming, fisheries, agricultural labour and livestock, which, in turn, undermines the food security situation of the population, particularly those directly affected by natural disasters.

Agriculture

The Agriculture, Forestry and Fisheries sector of Sri Lanka account for 7.9 percent of the total GDP, which has grown by 5.5 percent in value added terms during 2015 compared to 4.9 percent growth in 2014.[43] Rice is the single most important crop occupying 34 percent (0.77/million ha) of the total cultivated area in Sri Lanka. On average 560,000 ha are cultivated during Maha (major season from September-March) and 310,000 ha during Yala (minor season from May-August) making the average annual extent sown with rice to about 870,000 ha. About 1.8 million farming families are engaged in paddy cultivation island-wide. Over 10 percent of the total agriculture sector is directly contributing to rice production. The paddy production in the previous year (2015) increased to an all-time high level, supported by conducive policies and favourable weather conditions. The production of paddy, which was severely affected by extreme weather conditions in 2014, increased by 42.6 percent resulting in the production of 4.8 million MT in 2015. It is projected that the demand for rice will increase at 1.1 percent per year and to meet this requirement, the rice production should grow at the rate of 2.9 percent per year. Nonetheless, climate change induced natural disasters and expedite industrialisation are key challenges to the expansion of the rice sector. However, increasing

43 Central Bank of Sri Lanka, Annual Report 2015.

the cropping intensity and national average yield can be considered as better avenues to achieve these production targets.

In the Yala season, Other Field Crops (OFCs) such as maize, soya bean, finger millet, green gram, cowpea, black gram, gingili, groundnut and vegetables mainly green chilli, big onion, red onion, potato are usually cultivated.

Paddy production details	Unit	Yala season		
		2014	2015	2016
Gross Extent sown	hectares'000	313	481	302
Gross Extent Harvested	hectares'000	301	476	N/R
Net Extent Harvested	hectares'000	272	429	N/R
Production	mt ' 000	1,145	1,942	1,225*
Average Yield	Kg/hectare	4,204	4,527	3,728*
Credit Granted for farming	LKR Mn	1,588	2,088	N/R

Table 34. Rice production summary statistics.
Source: estimated figures from Socio-Economics and Planning Centre, Department of Agriculture.

As of May 2016, nett enrolment in Yala 2016 is significantly less than the previous two years (Table 34). Farmers were also provided with fertiliser subsidy and cash loans through community based Divineguma banks and other government banks.

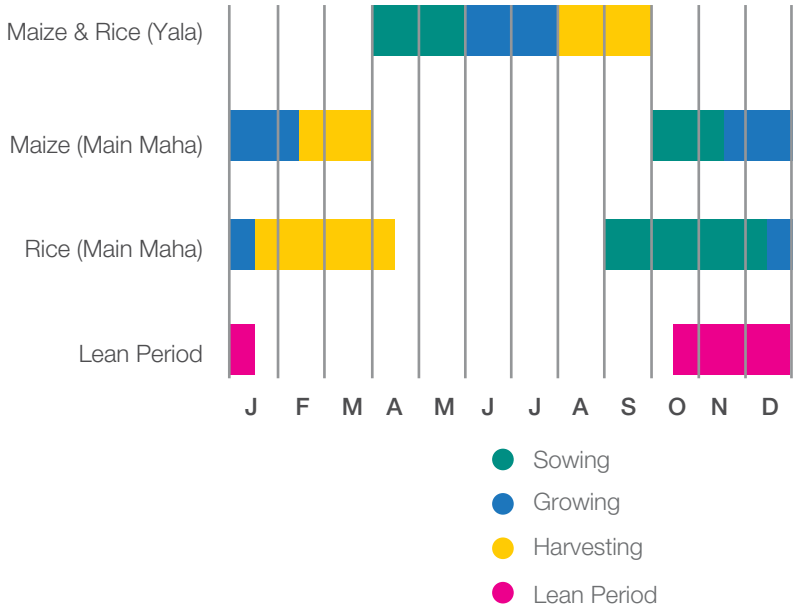


Figure 11. Crop calendar Sri Lanka. Source: FAO/GIEWS, 2016.[44]

The fisheries sector accounts for more than 1.4 percent of the national GDP, making it the highest contributor for the agricultural sector in the year 2015.[45] Nevertheless, the fisheries sector has shown some drawbacks compared with its past growth trends due to various factors. In 2015, the revenue generated by inland fishing was reduced due to the low harvesting as most of the inland fishing reservoirs were filled

44 *Refer http://www.fao.org/giews/countrybrief/country.jsp?code=LKA*

45 *Central Bank of Sri Lanka, Annual Report 2015.*

to full capacity. Furthermore, the continued rainfall in 2016 reduced the inland catch since fisherman could not fish due to extreme weather pattern, and also simultaneously resulted in the overflow of water reservoirs leading to loss of fish stocks.

Sub-sector	Total production (MT'000)	
	2014	2015
Marine	459	453
Coastal And Lagoon	279	269
Offshore	180	184
Inland Fisheries	76	67
Capture	69	57
Aquaculture	2	3
Shrimp Forms	5	7

Table 35. Total fisheries production in Sri Lanka. Source: Central Bank of Sri Lanka, 2015.

The table above shows the annual production within the fisheries sector. As a result of the experienced loss of number of fishing days in 2015, the total catch for marine, coastal and inland fisheries also reduced due to continuous weather advisories/alerts issued.

Food Insecurity

Overall the national food production and availability has shown positive trends in 2015. In 2015, the availability of rice increased by 22 percent compared to 2014, and was reported as a surplus production, assuming that the per-capita annual rice consumption was 110 Kg/year/person. The imports of rice in 2015 had reduced by more than 50 percent compared to 2014. Due to the excess production reported in 2015, the Department of Agriculture forecasted that the rice production in 2016 would be sufficient for household rice consumption till mid-March 2017.[46] Availability of fresh-milk, coconut oil has also increased significantly.

Item	Unit	2014			2015		
		Production	Imports	Per Capital Availability (Kg per year)	Production	Imports	Per Capital Availability (Kg per year)
Rice (a)	MT'000	3,011	600	143	3,373	286	175
Maize	MT'000	162	99	16	261	79	16
Wheat	MT'000	-	1,179	57	-	1208	58
Big Onion	MT'000	59	151	12	89	210	14
Sugar	MT'000	31	520	28	56	624	32
Potatoes	MT'000	52	118	10	97	142	11
Fresh Fish	MT'000	385	21	27	520	34	26
Cow Milk	Mn Liters	192	-	13	305	-	15
Coconut Oil	MT'000	65	6	2	53	6	3

Table 36. Food balance sheets for major food commodities. Source: Department of Census and Statistics, 2015.

46 *Source: Department of Agriculture, Crop forecast-July 2016*

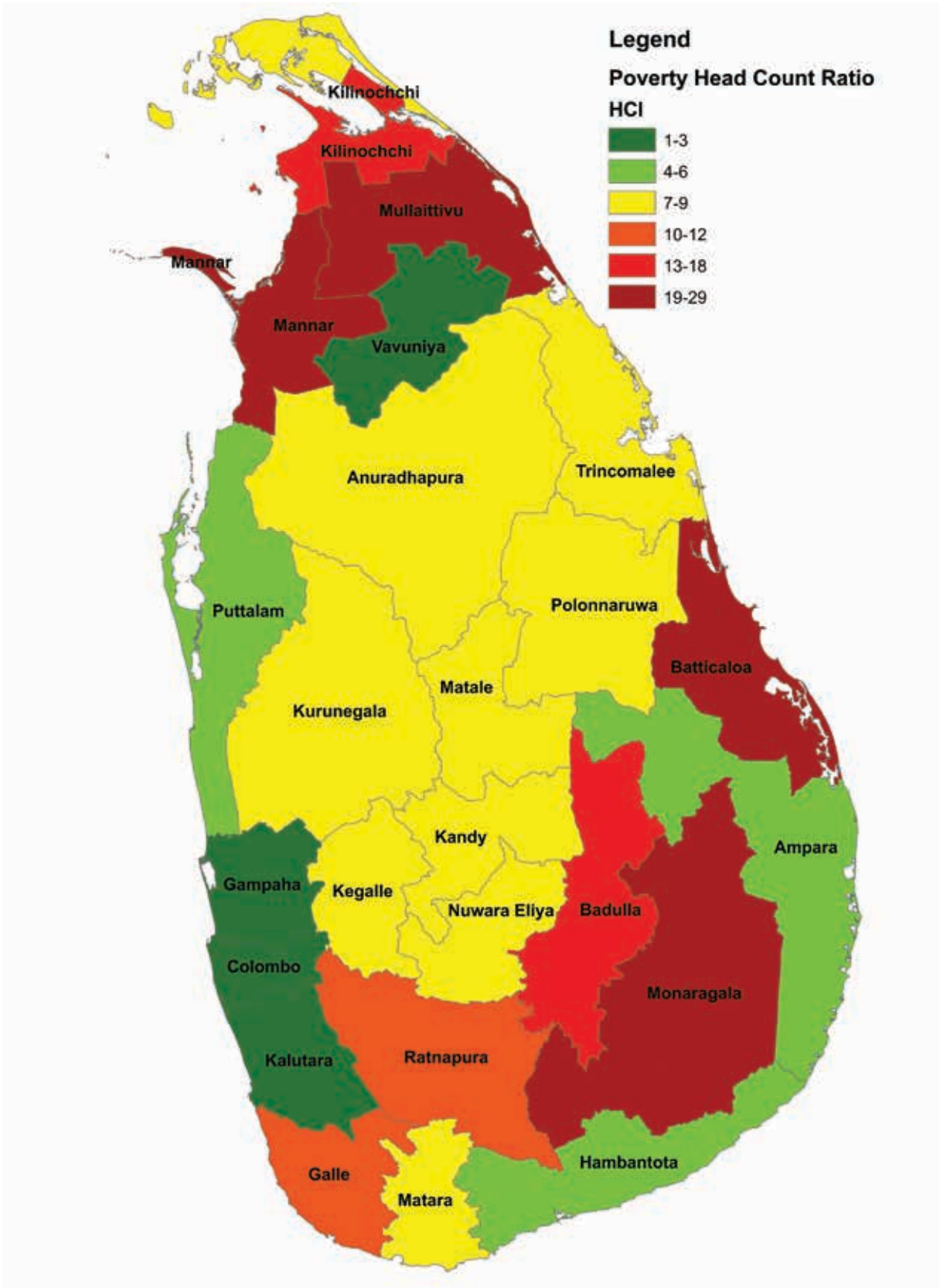


Figure 12. Distribution of poverty headcount index in the country, Source: Department of Census and Statistics, 2014.[47]

47 *Department of Census and Statistics, 2014, Poverty Headcount Ratio Brief: Decomposition of Consumption Poverty.*

Even though the country achieved self-sufficiency status for meeting the demand of rice in 2015, the presence of vulnerable pockets of food insecurity is still noticeable. Nearly 22 percent of the total population in Sri Lanka is reported as undernourished[48] and most importantly, over 40 percent of the population in the Northern and Eastern Provinces have been identified as food insecure.[49] Poverty head count ratio in the Northern, Eastern and Uva Provinces was reported to be higher than the rest of the country, in particular Mullaitivu, Monaragala, Mannar, Batticaloa, Kilinochchi and Badulla districts.[50] Moreover, 34 percent of the population cannot afford the minimum cost of a nutritious diet.[51]

Post-disaster Effects

Agricultural crops

As of May 2016, the total agricultural land cultivated with rice was reported at 302,000 ha and the paddy cultivations were at their initial stage of sowing or growing period.

Nearly 2 percent of this paddy cultivation was destroyed by the recent floods. As the paddy was in the initial sowing or growing stage, the total losses are reported at LKR 553 million, which includes only the losses associated with the required replanting (i.e. buying seeds, planting material, and other related agricultural inputs etc.). The damages associated with the disaster, however, such as the cost of land rehabilitation and desilting (which would represent the damage component of this sub-sector), was not calculated due to lack of information.

Fortunately, since most of the paddy cultivation was at its early stage, many districts were able to replant.[52] Nevertheless, a slight reduction of production is expected since the growing and maturation period of the crop will be shorter. Unfortunately, it was not possible to estimate the likely reduction of production, thus it was not taken into account in this report. Given the favourable production levels of rice in year 2015, the loss of production due to the floods in the minor season (May 2016) will not significantly impact the availability of rice, assuming the Maha 2016/17 is successful.

Crop	Total area under cultivation (Ha)	Total area destroyed (Ha)	Total estimated cost of Loss (LKR million)
Paddy	301,693	6,011	553.00

Table 37. Reported loss for paddy cultivation. Source: Department of Agriculture.

In relation to other crops, the highest damage was reported on groundnut and green gram. The estimated cost of the damage to the other crops and export crops is LKR 331 million and the estimated cost of the loss of the production is LKR 1,104 million. The highest impacts on agriculture are reported from Jaffna, Anuradhapura and Mullaitivu districts.

48 *Source: Global Food Security Update, 2015*

49 *Source: World Food Programme, 2012*

50 *Department of Census and Statistics, Household Income and Expenditure Survey 2012/13.*

51 *Source: HARTI, Cost of Diet Analysis, 2014*

52 *Source: Socio Economics and Planning Centre, Department of Agriculture*

Crop	Total area under cultivation (Ha)	Total area destroyed (Ha)	Total production loss (MT)	Total estimated cost of damage (LKR million)	Total estimated cost of losses (LKR million)
Green chilli	3,146	422	1,811	52.50	208.18
Big onion	599	94	1,590	34.72	91.53
Red onion	837	39	474	18.75	37.50
Potato	507	1	17	0.79	1.60
Maize	6,423	492	1,650	46.15	82.41
Soya bean	2,045	49	86	4.59	6.49
Finger millet	448	4	5	0.08	0.12
Green gram	4,624	644	916	38.64	164.95
Cowpea	1,775	270	429	39.60	64.56
Black gram	1,507	379	296	23.72	71.17
Gingili	10,047	135	104	6.64	10.38
Groundnut	4,240	710	1,667	42.57	266.55
Pepper*	2,506	10	34.8	16.00	41.0
Clove*	1,778	9	51.6	6.00	56.0
Cinnamon*	360	2	0.2	0.20	0.3
Total				**330.95**	**1,102.75**

**district wise breakdown for indicated crops unavailable*

Table 38. Reported damages and losses for seasonal and export crops. Source: Department of Agriculture and Department of Export Agriculture.

Damages to the fruits, vegetable cultivations and nurseries are reported in Trincomalee, Batticaloa, Ampara, Hambantota and Kegalle districts and are estimated at LKR 15.5 million, whilst the total income loss harvest for horticultural as well as perennial crops such as fruits is estimated as LKR 44.1 million.

Type	Total area destroyed (Ha)	Total estimated cost of damage (LKR million)	Total estimated cost of loss (LKR million)
Fruits*	190	9.5	28.1
Vegetables*	297	0	16.0
Nursery*	13	6.0	0
Total	**500**	**15.5**	**44.1**

**district wise breakdown for indicated crops unavailable*

Table 39. Reported damages to the horticulture sector. Source: Department of Agriculture

Floods and landslides have caused the acute food insecurity in few of the districts. According to the rapid needs assessment led by the Ministry of Disaster Management from 21-25 May 2016, 12,000 households in four districts (Colombo, Gampaha, Kegalle and Ratnapura) were reported as severely food insecure due to the serious impacts on their livelihoods and livelihood assets created by floods.

Agricultural irrigation (small and medium scale)

Medium and small-scale agricultural reservoirs (tanks), anicuts and channels in the Minor Irrigation Scheme network (which fall within the authority of the Department of Agrarian Development of the Ministry of Agriculture) were also reported as damaged or destroyed. Here, the total corresponding assessed damage was reported at LKR 1,316 million. The costs were estimated using the current costs of rehabilitation for

irrigation infrastructure. A further detailed discussion of the damage to this network in relation to the larger irrigation network of the country is discussed in the Irrigation chapter.

Type of irrigation	Surface of irrigation systems affected (Ha)	Total estimated cost of damage (LKR million)
Tanks	6,350	1,011.8
Anicuts	215	42.8
Channels	5,000	261.6
Total	**11,565**	**1,316.1**

Table 40. Reported damages to the agricultural irrigation sector. Source: Department of Agrarian Development.

Agricultural Labour

The agricultural labour sector was also drastically affected by floods and the total loss for the sector is estimated as LKR 99 million. In 14 districts, over 34,000 agricultural labourers have lost at least five working days due to floods during May 15 to 22, 2016. As a result of loss of livelihood opportunities due to floods, food security status among flood affected agricultural labourers is likely to have deteriorated. Therefore most of the labourers had difficulty coping with the current expenditure on food due to the reduced purchasing power as a result of limited earnings.

The agricultural labourers mainly work on planting, weeding, fertilising and watering the plantations. The loss was calculated using the average wage rates for both men and women.

District	Estimated number of agricultural labourers affected	Estimated loss of wage in agricultural employment (LKR million)
Colombo	2,044	5.9
Gampaha	4,032	11.6
Kegalle	4,502	13.0
Kilinochchi	7,087	20.4
Ratnapura	5,753	16.6
Kalutara	1,077	3.1
Mannar	2,591	7.5
Mullaitivu	2,288	6.6
Vavuniya	1,718	5.0
Kandy	1,113	3.2
Puttalam	545	1.6
Galle	594	1.7
Jaffna	425	1.2
Nuwara Eliya	540	1.6
Total	**34,309**	**98.9**

Table 41. Reported losses to the agriculture sector. Source: Sri Lanka Labour Force Survey, 2015, and District Situation Reports.

Livestock

Data for livestock has been reported only in the Western province and in the Kegalle district. Accordingly, 144 livestock farms have been affected due to the floods, resulting in LKR 25 million of damage as a result of the death of livestock.

Description	Numbers of affected farm units	Total estimated cost of damage (LKR million)
Farms (poultry cattle, swine, buffalo)*	144	25

*district wise breakdown unavailable

Table 42. Reported damages to the livestock sector. Source: Ministry of Rural Economic Affairs.

Unfortunately, data from other districts was not available and further calculation on the effect of the flood, both in terms of damages and losses, in the livestock sub-sector was not possible.

Fisheries and Aquaculture

The total damage to fishery sector is estimated at LKR 10.5 million, out of which the highest damage is reported due to damage to equipment, such as fishing nets. Moreover, 71 fishing ponds and 13 shrimp farm ponds of different sizes have been damaged during the floods and will require reconstruction.

List of fishing/ aquaculture activities	Production unit (man, type of boats, fish ponds etc.)	Number of affected production units	Total estimated cost of damages (LKR million)	Total estimated cost of losses (LKR million)
Fish pond*	Food Fish Ponds	71	2.9	0
	Shrimp Farm Ponds	13	3.2	0
	Sea Cucumber Farmers	18		101.5
	Sea Weed Farmers	300		1.5
Inland Fishing*	Nets	1,314	3.9	0
	Canoes	8	0.5	0
Total			**10.5**	**103**

*district wise breakdown unavailable

Table 43. Reported damages to the fishing sector. Source: Department of Fisheries.

Coastal fishing was also disturbed due to the high-wind and heavy rains, which prevailed in the south-eastern region and northern coastal areas during the storm that caused the heavy rains and floods. As a result, the loss of sea cucumber harvest is estimated as LKR 101.5 million.

Furthermore, most of the fishermen who fish in the shallow-water lost their fishing activities for approximately five days from May 15 to 20, 2016. However, the loss of income in fishing was not accounted under the losses section due to lack of data.

Summary of Damages and Losses

Sub-sector	Estimated cost of Damages (LKR million)	Estimated cost of Losses (LKR million)
Paddy	0	553
OFC	330.95	1102.75
Cultivations and Nurseries	15.5	44.1
Agricultural Labour Losses	0	98.9
Livestock	25	0
Fisheries and Aquaculture	10.5	103
Irrigation Infrastructure	1316.1	0
Total without Infrastructure	381.95	1901.75
Grand total[53]	**1698.05**	**1901.75**

Table 44. Food Security, Agriculture, Livestock, Fisheries damages and losses.

Impact Analysis on Development Goals

The Government has developed a National Physical Plan to be implemented from 2011-2030, with the aim of developing the country. It is important to analyse the plan considering its implication on the environment and the socioeconomic and political situation of the country.

The National Physical Plan proposes to develop areas like Anuradhapura, as well as several areas in the North and Moneragala, for the production of export-oriented crops, such as vegetables, groundnuts, sugar cane, palm oil and timber for the market. Investors will be allowed to start new industries here. Municipal Council zones, special towns and district capitals will be established in agriculture based areas like Mannar, which have now been earmarked for development of industrial zones, investment zones, information technology centres and commercial centres and not as centres of agriculture. The areas from Gampaha district to Kalutara, Matara, Hambantota up to Tanamalwila are going to be declared as Municipal zones. Similarly, the areas between Ampara and Batticaloa will be renamed as Eastern Municipal zone while Trincomalee, Polonnaruwa, Dambulla and Anuradhapura areas will come under the North Central Municipal Council area. Mannar, Kilinochchi and up to Point Pedro will be renamed as the North Municipal Council zone.

The National Physical Plan to be implemented from 2011-2030 may also, however, create negative impacts on the ecosystems, which have so far not been disturbed by development interventions. Similar disasters may occur periodically if proper actions are not taken for sustainable development.

Cross-cutting Issues

Agriculture continues to be the backbone of the poor in the country. They are trapped in poverty at subsistence level by low productivity and low economic returns. Women are actively involved in agricultural activities but have unequal access to skills, agriculture extension services and markets. They are often relegated to the role of unpaid family workers without access to independent income or they are agriculture labourers receiving lower wages than male labourers

53 *Of these damages and losses, a total of LKR 1,604.2 million for damages and LKR 1,543.5 million for losses could be broken down to a district level. The remainder was unavailable at this level during the period of assessment*

The impact of the flood on rice paddy cultivation has potential implication on food security. Consultations with women and men in Puttalam, Chilaw and Kegalle indicate that the local communities managed to secure their food stock during the flood. However, concerns have been raised by NGOs that whilst the communities may be food secure in terms of amount of food stored and saved, the quality (nutritional value) of the stocks, might be a concern, especially considering the low nutrition status of children in the country (21.6 percent under 5 children are underweight) and women (18.4 percent of pregnant women and 18.2 percent of non-pregnant women are undernourished).

Farmers indicated that they have had to replant their rice and vegetables, which will extend the maturation period until they can start harvesting. Such a situation has negative implication on men and women. In fact, women, who are responsible for securing food at home, may have to work more by engaging in additional casual labour. For some, this may be the only option to provide food at home before they are able to resume getting food from their own production.

Recovery and Reconstruction Strategy

Short term

The total recovery requirements in the short term is estimated at LKR 396 million. This amount is required until the end of the year 2016.

Recovery in the agriculture sector focuses on immediate activities aimed at the restoration of production levels in crop, livestock and fisheries. Specifically, recovery needs include:

Crops : Provision of agricultural inputs for crop planting including crops, pulses and vegetable seeds packages with special focus on short-term varieties. In addition, it is essential to ensure the provision of fertiliser through the government subsidy scheme, particularly for those who have replanted the paddy and OFCs in the Yala 2016 season.

Livestock : Provision of veterinarian assistance as well as restocking of small animals (i.e. poultry) in the severely affected regions, particularly in Gampaha and Puttalam. Moreover, it is important to target the most vulnerable households who have lost their backyard poultry during recovery initiatives.

Fishery/Aquaculture : Provision of inputs for fishery restoration, especially restoration of damaged fish and shrimp ponds and provision of shrimp/fish feed and other required inputs (i.e. liming material) to small-scale aquaculture farming households.

Food Security and livelihoods

- Provision of targeted food assistance to the most affected households through in-kind, voucher or cash mechanisms, especially for households which have not yet benefitted from the governmental assistance.
- Identify and map vulnerable livelihoods at the frontline of climate-related food security threats as a basis for developing the food security component of the national adaptation plan.
- Facilitate access to agricultural loans and to wave-off the interest for the loans to those who have been severely affected by floods.

Irrigation infrastructure : Immediate restoration of water wells, small dams and small-scale irrigation canals (detailed under the Irrigation Sector section).

Medium term

Medium term interventions were mainly designed to build back the damaged agricultural infrastructure and to improve the farming skills of farmers to minimise future losses. In addition, these interventions also look at enhancing crop, livestock and fishery/aquaculture production in order to guarantee full recovery of those affected communities.

Cash for work or food for assets are recommended mechanisms as medium-term interventions, which will support communities to ensure household food security while the livelihood and irrigation assets are restored. Moreover, community-based resilience building is also a key component of all the interventions proposed under the medium-term interventions.

Crops

- Shift crop production towards climate change adapted varieties.
- Organise crop calendar based on climate predications and introduce inter-cropping systems.
- Promote inter-seasonal cultivations and crop diversification through training.
- Promote more studies and research on flood resistant agricultural practices through the involvement of academia and research institutes.

Livestock

- Increase access to animal health services, especially through government extension offices.
- Conduct training on livestock production including disease prevention, composting, advanced rearing practices and livestock diversification.

Aquaculture/Fishery

- Conduct training on aquaculture production, including disease prevention, integration of rice and fish based farming systems and marketing.
- Develop technical guidelines for better aquaculture cultivation to ensure the quality, productivity and environmental protection aspects.

Food Security and livelihood

- Develop an integrated approach to enhance food security in terms of food access and food utilisation at the household level.
- Develop a consolidated analysis for resilience profiles, including aspects of food security status, livelihood diversity, climate sensitivity of income sources, as well as of food sources in the affected provinces.

Irrigation

- Construct, rehabilitate the irrigation infrastructure and re-enforce dams (details in Irrigation Sector section)
- Identify the possibility to expand the existing capacity of the reservoirs to hold more water.
- Introduction of improved irrigation systems resilient to flash floods.

Long term

- Impact of deforestation, disturbance to the hydro-catchment and collapse of cascade systems have affected the carrying capacity and water run-off in most of micro-irrigation tanks in Sri Lanka. Most of the small-scale tanks are getting drier within a short period and overflow during intensive rainfalls. Therefore, long-term interventions are mainly recommended at the restoration of deteriorated irrigation infrastructure in the country, including medium and micro-scale hydro catchments. Further, canal systems should be reinforced using the modern technology, which can sustain for a long duration and stand against floods.
- Coastal erosion and salt-water intrusion are becoming a major issue especially in the Northern coastal regions. In order to minimise the impact of coastal erosion caused by storms, restoration of mangrove fields is important. Mangroves were vastly destroyed for commercial marine aquaculture, which has caused more negative impacts during the natural disasters especially floods and cyclones. Therefore, training of farmers on the conservation of mangroves, hydro-catchments is also important.
- In addition to the long-term investments on restoration of durable infrastructure, community based resilience building initiatives are also recommended. Livelihood diversification, introduction of adaptation techniques through farmer training programmes, introduction of flood resistant crops and farming techniques are also important.

Recovery and Reconstruction Needs with Costs

Needs		Short-term (2016)	Medium-term (2017)	Long-term (2018-2020)
Recovery	Crop input supply	366	-	-
	Input supply in fisheries	5	-	-
	Input supply for livestock and poultry	25	-	-
Reconstruction	Replacement of agriculture inputs, tools and machineries	-	96	
	Reconstruction of agricultural infrastructure including small scale irrigation including cash for work	-	1,316	-
	Reconstruction of fish ponds	-	11	-
	Livelihood diversification package and training programmes for agricultural labour households		85	
	Restoration of degraded watersheds, mangroves in the flood affected regions			507.5
	Total Needs (LKR million)	**396**	**1,508**	**507.5**

Table 45. Food Security, Agriculture, Livestock, Fisheries recovery and reconstruction needs.

Implementation Strategy for Recovery

The Ministry of Agriculture (MoA) is recognised as the lead agency for the implementation of recovery strategies. The Ministry of Disaster Management, Ministry of Mahaweli & Environment and Ministry of Irrigation are identified as other government stakeholders.

With regards to monitoring and evaluation, it is strongly recommended that the monitoring and evaluation unit within the MoA be mandated to lead this task. The monitoring team should ensure that information is shared with other relevant partners such as other government agencies, UN agencies such as the FAO and WFP and other NGOs.

The key institutions under the MoA, mainly the Department of Agrarian Development and Department of Agriculture, have enough skilled human resources capable of monitoring and coordinating the implementation of proposed recovery strategies. Any further gaps on monitoring could be fulfilled with technical support from FAO and WFP.

Sector Assessment Methodology

Data collection:

For the data collection, a PDNA action group under this sector was formed. Additional sub-sectors were formulated under fisheries, crops, livestock and food security. All secondary data sources for effects (damages and losses) were identified and collected by the above sub-sector leads.

Damage is defined as monetary value of completely or partially destroyed assets such as social, physical and economic infrastructure, calculated at market value of lost immovable assets. The damage was estimated under each sub-sector by estimating the monetary value of the replacement costs at current market prices i.e. replacement cost of tools and fishing gear etc.

Losses were estimated using the values of loss of harvest, cost of re-plantation, cost of land preparation, loss of labour, diminished revenue, etc.

Assumptions

The below assumptions were made for calculating the losses and damages and recovery needs:

- The recovery needs have been calculated using the principle of build back better.
- No data reported as damage to the lands, which involve the costs of debris clearance.

OON MAP
key
DS Division
Periyakalappuwa Lagoon
High-Land
Lotus
Salminiya
Mud
Bridge
Main road
Mugathuwaram Sea
Mathurai Tree
River
Village Boaders
Less Fish
Paddy Field
Pottuvil Road

Industry and Commerce

Executive Summary

The overall objective of this assessment is to take stock of the damages and losses faced by the sector as a result of the heavy rainfall, flooding and severe landslides, from May 14, 2016 onwards, and provide estimates of the recovery and reconstruction needs. The assessment covered the sector partially as there is no central government or private sector agency, which regularly collects and maintains data and information of the industry and service sector. Given the time constraints, this assessment is primarily based on data obtained from the Insurance Board of Sri Lanka, Ministry of Industry and Commerce, Board of Investment and also based on the estimates made using baseline information from the Department of Census and Statistics.

In this disaster, the six most affected districts (i.e. Colombo, Gampaha, Puttalam, Kegalle, Ratnapura and Anuradhapura), account for 41 percent (281,336 establishments), i.e. nearly half of the industry and trade establishments in the country and also account for about 780,000 employees. The damages and losses of the industry and commerce sector in all districts have been assessed to be LKR 30.96 billion, out of which LKR 25.09 billion are insured damages and losses. Out of all insurance claims, approximately 62 percent, equivalent to LKR 13.55 billion, accounts for damages and losses in the sub-sector of food and beverages and 70 percent of this damage and loss is from Colombo and Gampaha districts alone.

The Sector has assessed damages and losses only to industries owned by the private sector. State owned enterprises were not covered in this assessment.

The informal sector was badly hit by the disaster, especially in terms of flood related damages and losses in the six priority districts, accounting for LKR 5.87 billion, of which Colombo and Gampaha account for LKR 3.99 billion. Even though the informal sector represents only 19 percent of the total estimated damage and losses in the industry and service sector, in terms of impacts on livelihood and employment the post disaster effects are significantly high in this sector. Almost half (47 percent) of all damages and losses estimated are reported from Colombo district, followed by Gampaha, which is around 21 percent.

The lack of proper mechanisms to collect damage and loss data and unavailability of business continuity plans had been identified as the key issues in this sector assessment. The sector recovery cost will largely be absorbed by the insurance companies and NITF, but in terms of strengthening post disaster information management system, promoting disaster risk preparedness and business continuity planning among private sector an additional estimated cost of LKR 27 million will be required for the sector recovery.

Pre-disaster Context and Baseline

Structure of Industry and Commerce sector

For the purposes of this report:

- ***Industry*** refers to manufacturing, mining and quarrying, construction, and other industries.
- ***Commerce*** refers to services, businesses and traders.

The “Non-Agriculture Economic Activities in Sri Lanka-Economic Census 2013/2014” conducted by the Department of Census and Statistics in 2013, listed 679,495 industry and trade establishments in the country of which 63 percent are wholesale and retail establishments. A detailed breakdown of the industry and trade establishments and population employed is given in Table 46.

The industry and commerce sector are the most important sectors of the economy of the country, accounting for 82.8 percent of the GDP of Sri Lanka (industry at 26.2 percent and services at 56.6 percent)[54] of which 23.2 percent is from wholesale and retail trade, transportation and storage, and accommodation and food service activities. A full table on the percentage distribution of GDP within the sectors is given in Annex 10. Industry and Commerce Sector.

From Table 46, in terms of the number of people employed in the industry and trade establishments, the largest sector is the manufacturing sector, which employs 57 percent of the labour force. The wholesale and retail sub-sector employs 40.3 percent of the total labour force of industry and trade establishments, and the remainder is distributed amongst the other sub-sectors, such as construction, mining etc.

About 56 percent of the manufacturing industries are not registered, while in the trading sector about 36 percent are not registered (i.e. informal industries).

Geographically, industries are located mainly in Gampaha, Colombo, districts along the Kelani River and Kurunegala, Kalutara and Kandy districts. The trading enterprises are concentrated in Gampaha, Colombo and Kurunegala. Manufacturing enterprises are highly concentrated in three provinces i.e. Western Province, Southern Province and North Western Province. More details are provided in Table 46 and Table 47 below.

Sector	Subsector	No of Establishments		No of Persons employed		No of Establishments (%)		No of Persons (%)	
Mining and Quarrying		8,917		45,000		1.3		2.4	
Manufacturing		240,846		1,092,572		35.4		57.3	
	Food and beverages		56,235		227,605		23		23.3
	Textiles, apparel, leather		72,215		486,018		30		30.0
	Wooden products & furniture		36,331		79,688		15		15.1
	Other non-metallic products		31,532		79,352		13		13.1
	Basic metal		16,857		43,348		7		7.0
	Other products		27,676		176,561		12		11.5
Other industries		2,795		NA		0.4		NA	
Construction		8,322		NA		1.2		NA	
Wholesale and retail trade		418,615		767,882		61.6		40.3	
	Wholesale		4,634		214,318				
	Retail		343,981		553,564				
Total		**679,495**		**1,905,454**		**100.0**		**100.0**	

Table 46. Structure of Industry and Commerce.
Source: Non-Agriculture Economic Activities 2013/14-Census and Statistics Department.[55]

54 *Central Bank of Sri Lanka, Annual Report 2015.*

55 *Other industry and construction employment data were not available.*

	Industry	%	Commerce	%	Total	%
Gampaha	32,561	12	49,081	12	81,642	12
Colombo	28,648	11	56,222	13	84,870	12
Puttalam	12,866	5	18,123	4	30,989	5
Ratnapura	11,216	4	19,959	5	31,175	5
Anuradhapura	11,048	4	18,017	4	29,065	4
Kegalle	8,772	3	14,823	4	23,595	3
Other districts	155,769	61	242,390	58	398,159	59
Total	**260,880**	**100**	**418,615**	**100**	**679,495**	**100**

Table 47. Enterprises in Industry and Commerce sectors by districts. Source: Census & Statistics-Non-Agricultural Economic Activities in Sri Lanka.[56]

Small and Medium Enterprises (SMEs)

About 80 percent of all business establishments in the country belong to the SME category, particularly in the service sector, where SMEs account for more than 90 percent of the establishments.[57] Further SMEs provides 45 percent of the total employment and also contributes to 52 percent of the GDP of the country.[58] For these reasons, the Government of Sri Lanka recognises SMEs as the backbone of the economy.

The term SME has different meanings in different contexts and countries. The commonly used yardsticks to define SMEs are total number of employees, annual turnover and total investment.

In Sri Lanka, a SME is defined in the National Policy Framework document on SME development. In the Policy Framework, SMEs are defined based on the number of employees and annual turnover, as shown in Table 48.

Size	Sector Criteria	Medium (LKR million)	Small (LKR million)	Micro (LKR million)
Manufacturing Sector	Annual Turnover	251-750	16-250	Less than 15
	Number of Employees	51-300	11-50	Less than 10
Service Sector	Annual Turnover	251-750	16-250	Less than 15
	Number of Employees	51-200	11-50	Less than 10

Table 48. SME classification in Sri Lanka. Source: National Policy Framework for SME Development, Page 3.

Informal Sector

The informal sector is defined based on the registration status, accounts keeping practices and total number of regular employees of a given entity.

If an entity:

- is not registered in Employment Provident Fund/Department of Inland Revenue
- does not keep formal accounts
- the number of regular employees is less than 10

then such an entity is considered informal.

56 *Refer to Annex 10. Industry and Services Sector for full table*

57 *Source: National Human Resources and Employment Policy, 2012*

58 *Source: National Policy framework for SME Development, 2012*

In Sri Lanka, the informal sector accounts for 59.5 percent of the total employment of the country. About 57 percent of the informal sector employment is in the non-agriculture sector, which comprises of industry and service sector activities. According to the Labour Force Survey (2014) of the Department of Census and Statistics, 43.7 percent of the total non-agriculture sector employments in Colombo district and 40.4 percent of Gampaha district belong to informal sector. Similarly in Kegalle, Ratnapura, Puttalam and Anuradhapura districts, the informal sector contributes to significant proportions of the total non-agricultural workforce, i.e. 53.8 percent in Kegalle, 48.5 percent in Ratnapura, 61.8 percent in Puttalam and 47.8 percent in Anuradhapura.

Post-disaster Effects

The recent disaster affected 24 districts, with the majority of the damages being reported from the priority districts of the PDNA: Colombo, Gampaha, Kegalle, Ratnapura, Puttalam and Anuradhapura. The priority districts account for about 41 percent (281,336 establishments) or nearly half of the industry and trade[59] establishments in the country and employ nearly 780,000 people.

The floods damaged business assets and disrupted business, causing losses to trading establishments, service providers and manufacturing units. Business premises and equipment were damaged, and businesses and services incurred revenue losses by having to curtail or stop production. Businesses that did not sustain direct physical damages are expected to have incurred revenue losses due to delays in accessing raw materials from their suppliers and employees not being able to come to work. Disruption of value chains is expected to cause medium to long-term impacts to many business, especially the SMEs. The inundation of the road network is expected to have added an additional layer of difficulty related to reducing incoming and outgoing material and labour.

The flooding lasted approximately a week and some of the affected trading establishments are likely to have experienced a drop in sales volumes and the impact on business activities would have continued after the flood waters receded. Businesses reported higher costs and lower revenues for some time beyond the week following the floods, as demand and supply re-adjusted. In the case of both manufacturing establishments and providers of commercial services, the value of economic losses is expected to be significantly higher than the cost of physical damages.

The damages reported in the rapid assessment conducted under PDNA could not be comprehensive as the damage and loss data was not available for most entities and as per the available data, only a few enterprises account for the majority of the damages. The Ministry of Industry and Commerce had just initiated a survey while the PDNA was ongoing to assess the damages and recovery needs of the SMEs, however, the findings of the survey were not fully available for this sector assessment. The information on the impact to the informal sector, especially relating to the small micro-enterprises, is not available unless a comprehensive survey is conducted to collect the information.

As a systematic survey had yet to be completed, thus information on damage and losses for industry and commerce sector was not fully available for this assessment. Therefore, the sector team had to conduct a rapid ad-hoc survey to collect information from several sources i.e. Banks, Chamber of Commerce, Trade Associations and Insurance companies.

59 Industry covers mining and quarrying, manufacturing, other industries, construction while trade covers wholesale and retail trade.

Twenty-one insurance companies currently operate in Sri Lanka, of which 18 offer non-life related insurance, with subclasses including fire. Natural catastrophe coverage is issued as an extension or endorsement of existing fire and allied perils policies by most insurers.[60]

This assessment is primarily based on the information received from 14 of these insurance companies on insurance claims.

The insurance companies could only provide reported information relating to their customers in the industrial sector and could not provide detailed information relating to their loss of output and revenue forgone. The information has not yet been fully verified. Therefore the volume of losses had not been adequately captured in the report.

As per the nature of the claims, most businesses belong to formal sector. Thus a separate estimate was done for the informal sector.

The total damage and loss of the industry and commerce sectors in all districts have been assessed to be LKR 30,965 million out of which LKR 25,090 million are insured damages and losses (see Table 49). Out of all insurance claims, approximately 62 percent are in the manufacturing sector, of which 87.5 percent is from food and beverage sector including Tea (see Figure 13). The damages to two corporations in the beverage sector account for around LKR 5 billion and are located in the Gampaha district. The tea sector has reported damages and losses for 62 enterprises, accounting for LKR 5.776 billion. The most affected is undoubtedly Gampaha district (45 percent) followed by Colombo at 25 percent as these two districts have a high concentration of industries. In 27 percent of the claims, the exact district is not given. However, considering the distribution of the total damages and losses in the sector, it can be assumed that majority of these also belong to Gampaha and Colombo districts.

Sector wise Insurance Claims

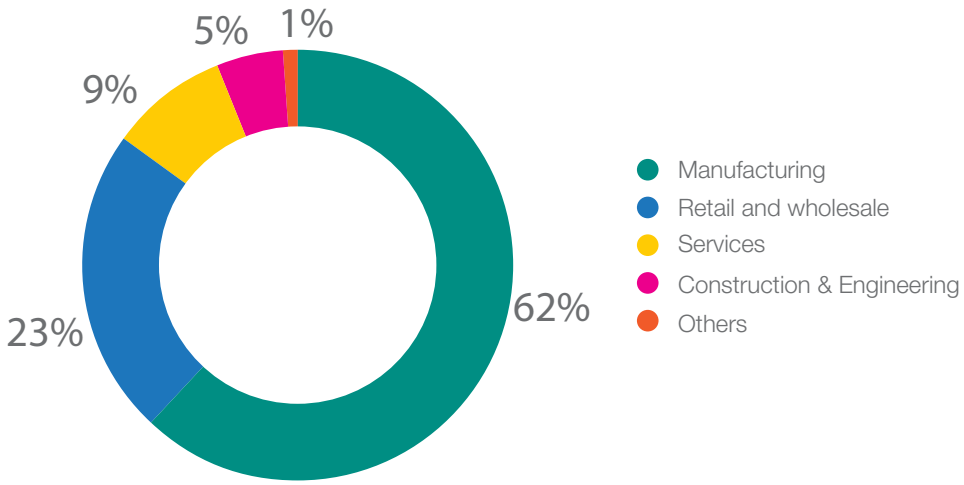


Figure 13. Sector-wise insurance claims.

Given that most of the industries are located within areas that are prone to flooding, the banks and corporate sector would have requested their clients to insure the businesses. The enterprises which reported that they were affected by floods in Colombo (Kolonnawa and Kaduwela) and in Gampaha District (Biyagama) were located in low-lying areas and insurance coverage of the industries may be higher. It would also be useful to assess whether 2010 flooding had encouraged industries to obtain insurance cover in recent

60 *Source: National Human Resources and Employment Policy, 2012*

years. Given that the insurance information is not adequately available in more detailed form, we cannot arrive at this conclusion very factually. Most of the information collected from the insurance companies did not report losses.

District	Damage (LKR million)	Losses (LKR million)	Total (LKR million)	Percent
Colombo	6,087.49	256.98	6,344.47	25.29
Gampaha	5,611.89	5,751.25	11,363.14	45.29
Ratnapura	12.29	-	12.29	0.05
Kegalle	82.94	8.41	91.35	0.36
Puttalam	9.98	-	9.98	0.04
Anuradhapura	12.55	-	12.55	0.05
District not given	7,170.17	13.36	7,183.54	28.63
Other districts	57.47	15.45	72.91	0.29
Total	**19,044.78**	**6,045.45**	**25,090.23**	**100.00**

Table 49. Total insurance claims up to August 15, 2016.

SME Sector

The Ministry of Industry and Commerce had initiated an assessment on damages and losses to the SMEs. Even though the study was not completed, the available data from 11 districts gives a total damage and losses of LKR 657 million from 504 SME establishments (Annex 10. Industry and Commerce Sector). However, the data from Gampaha district is not available in this assessment and the data from Colombo was limited to SMEs in Kaduwela DS division only.[61] Additionally, of the LKR 657 million damages and losses reported, LKR 600 million of this comes from just 57 of the SMEs affected in the Kaduwela DS division.

These identified damages and losses are not combined to the total of damages and losses in the industry and commerce chapter as it was not possible to identify any redundancies with the data obtained from the insurance sector. Particularly, the 57 SMEs that represent the bulk of the damages and losses are part of the formal sector, and there remains a strong likelihood that their damages fall within the insurance sector data.

Thus this only emphasises that there remains a large category of medium and small enterprises for which values are unknown.

Informal sector

Actual post disaster data is lacking and scanty for the informal sector as a systematic survey is yet to be done. Therefore, the qualitative impacts of the disaster were drawn up based on discussions with stakeholders and affected communities and quantitatively by analysing baseline information of the Department of Census and Statistics on the informal sector. In the six priority districts, the number of affected informal sector establishments was derived by using the baseline information on informal sector establishment and percentage of households affected in the six districts.

The number of industry, trade and service establishments was available at DS division level for Colombo and Gampaha, with median[62] and mean annual turnover, thus a more comprehensive analysis, based on the following assumptions, could be conducted for these two districts.

61 *Kaduwela DS Division is one of 13 DS divisions in the Colombo District.*

62 *The median has been used by the Department of Census and Statistics when making calculations based on annual turnovers, due to the effect extreme outliers on the mean*

The average damage was taken as LKR 100,000 for Colombo and Gampaha. Discussions with affected people in Colombo and Gampaha revealed that most informal businesses were interrupted for more than three months. Therefore, losses were estimated for three months for Colombo and Gampaha by using the following formula for three months.

$$\text{Losses} = \frac{\text{Median Annual turnover} \times \text{No of Establishments} \times 3}{12} \times \%\ \text{affected in the division}$$

For other districts, only district-wise data on industry and service establishments was available, and average damage was taken as LKR 50,000, while average annual turnover was taken as LKR 100,000. These figures were deemed to be a conservative estimate.

Using these assumptions, the total damage and losses incurred to the informal sector in six priority districts was estimated at LKR 5.875 billion. Even though this is just 19 percent of the total estimated damage and losses in the sector, the impact of this is very high in terms of livelihood security and employment.[63] Almost half (47 percent) of the all damages and losses estimated in the informal sector are reported from Colombo district, followed by Gampaha (about 21 percent).

Summary of Damages and Losses

District	Insurance claims (LKR million)		Informal sector (estimates LKR million)					
	Damage	Loss	Damage	Loss	Damage	Loss	Totals	%
Colombo	6,087.49	256.98	1,223.83	1,544.66	7,311.32	1,801.64	9,112.96	29.4
Gampaha	5,611.89	5,751.25	684.89	538.02	6,296.78	6,289.27	12,586.05	40.6
Kegalle	82.94	8.41	316.57	316.57	399.51	324.98	724.49	2.3
Ratnapura	12.29		153.09	153.09	165.38	153.09	318.47	1.0
Puttalam	9.98		420.34	420.34	430.32	420.34	850.67	2.7
Anuradhapura	12.55		51.97	51.97	64.52	51.97	116.50	0.4
Districts not specified	7,170.17	13.36			7170.17	13.36	7,183.53	23.2
Other districts	57.47	15.45			57.47	15.45	72.92	0.2
Total	**19,044.78**	**6,045.45**	**2,850.70**	**3,024.66**	**21,895.48**	**9,070.11**	**30,965.59**	**100.0**
%	**61.5**	**19.5**	**9.2**	**9.8**	**70.7**	**29.3**	**100.0**	
Total	**25,090.23**		**5,875.36**					
% of total	**81.0**		**19.0**					

Table 50 Summary of damages and losses in the Inudstry and Commerce sector.

Impact Analysis on Development Goals

Given that the industry and commerce sector accounts for 82.8 percent of the GDP, and that they account for 71.5 percent of the total employed population, as well as the fact that most of these industry and commerce enterprises are located in districts most affected by the May 2016 disaster, it can be inferred that this disaster will have a substantial impact on the economy of the country.

61 *Kaduwela DS Division is one of 13 DS divisions in the Colombo District.*

62 *The median has been used by the Department of Census and Statistics when making calculations based on annual turnovers, due to the effect extreme outliers on the mean*

63 *Employment and Livelihoods chapter*

Even though the losses incurred by all the business establishments are not available, estimates made for the informal sector in Colombo and Gampaha districts alone show LKR 2.08 billion (Table 134) worth of losses due to Kelani floods, if the average business interruption period is three months.

As reported earlier, in established businesses the damages and losses would be over LKR 25 billion. 43.02 percent of the government revenue (equivalent to LKR 514 billion) is collected by the IRD in terms of tax revenue, of which approximately 37 percent comes from income tax collection and another 46 percent is collected as Value Added Tax.[64] Contribution of the corporate tax for all income tax collected for year 2014 is around 47 percent.

Tax concessions, which would have affected annual tax revenue, for enterprises affected by the flood have not been formally declared by the government. Nevertheless, the May 2016 floods and landslides will still have significant impact over the annual tax revenue of the government. For instance, one of the companies affected by the flood in the Kelani valley is considered to be the third biggest taxpayer of the country and will be out of business for an estimated five to six months.

Cross-cutting Issues

The disaster shows a lack of preparedness not only in the SMEs, but also among some of the well-established companies in the country. This PDNA revealed the importance of the Business Continuity Planning (BCP) and value chain sustainability in order to reduce the impact on industry and commerce sector due to future disasters. Lack of hazard maps down scaled to local authority level and the unavailability of risk profiles have made it difficult to prepare risk zonation and provide building restrictions and codes in industrial areas. In addition, environmental impact assessments or any other development control mechanisms (including environmental license and land clearance) that exist in the country do not pay sufficient attention to the disaster risk of the location in which a particular enterprise is going to be established.

As discussed in the Environment Chapter, some of the industries in the Kelani River banks are responsible for contamination of floodwater, which created a number of health hazards to affected people. Field visits made to the affected areas revealed that such contaminants are also responsible for crop damages in neighbouring villages, as some crops, which usually withstand several days of inundation, had been destroyed this time.

Recovery and Reconstruction Strategy

The government's National Natural Disaster Insurance Policy (NNDIP) covers all SMEs with an annual turnover less than LKR 10 million.

Therefore, as per the classification of SMEs by the National Policy Framework for SME Development (Table 48), only a subset of micro enterprises, as well as informal businesses, would be covered by the NNDIP.

Comparisons of insurance data and divisional data collected by the Ministry of Industry and Commerce show that a significant number of SMEs do not have risk insurance policies with other insurance service providers. In addition, the NNDIP covers only structural damages caused to a micro enterprise, with a maximum ceiling of LKR 2.5 million, where losses are not covered. Therefore, it is important that risk transferring practices are promoted among the SMEs in Sri Lanka to reduce the impact of future damages and losses on these SMEs.

64 Manchanayake, R.M.R.W, 2014, Annual Performance Report.

Lack of proper mechanisms to collect damage and loss data could be seen as the major challenge in post disaster recovery of the industry and commerce sector. The lack of business continuity planning and poor attention to disaster risk in investment decision-making is also clearly highlighted in the disaster.

Recommendations

Establish a monitoring mechanism to collect information in the Industry and Trade Sector : The information is available through various sources. However, it would be much more efficient to identify the sources and assign responsibility to persons within these sources so that more comprehensive information can be obtained on a timely manner in future.

Establish zoning and enforce the existing laws : In Colombo and Gampaha, many of the enterprises are located in flood-prone areas, aggravating the problem. Large numbers of informal and small enterprises need to be relocated from vulnerable areas or alternatively flood mitigation structures are required where necessary to protect economic elements. The relocation can be conducted in a phased manner to minimise the social impact. Making risk profiles available and consideration of risk profiles and risk zonation in providing land clearance for businesses as well as establishing industrial zones is important.

Establish/monitor Business Continuity Planning : BCP is required to promote business continuity and disaster preparedness planning among all enterprises in order to reduce future impacts.

Ensure insuring of assets in flood prone areas : In Sri Lanka, insurance penetration is still low and most of the informal sector enterprises are unlikely to have insurance cover. The micro insurance products can be introduced. Request the National Insurance Trust Fund to look into the possible extension of the recently activated disaster insurance policy to cover all SMEs for future disasters.

Recovery and Reconstruction Needs with Costs

Recovery needs	Costs (LKR million)		
	Short-Term (2016)	Medium (2017)	Long-term (2018-2020)
Identify and establish a mechanism to collect damage and loss data for industry and trade.		5.0	2.0
Develop guidelines for the SMEs for business continuity planning.		3.0	
Conduct programmes for chambers of commerce and its members on the importance of business continuity planning and risk transferring.		3.0	4.0
Develop a training module and conduct TOTs for the representatives drawn from chambers and other SME consultancy agencies on business continuity planning.		5.0	5.0
Develop risk profiles and make those available for the private sector.	Cost is covered under DRR		
Build the capacity of planners at both local and national level on disaster risks and risk sensitive planning.	Cost is covered under DRR		
Total		**16.0**	**11.0**
Grand Total			**27.0**

Table 51. Industry and commerce recovery and reconstruction needs.

Implementation Strategy for Recovery

The Ministry of Industry and Commerce will work closely with the Ministry of Disaster Management to establish the data collection system and also to implement the recovery needs. Ministry of Disaster Management will provide the technical inputs and will work closely with the Chambers of Commerce and Ministry of Industry and Commerce to promote business continuity planning.

The Ministry of National Policies & Economic Affairs, Ministry of Industry and Commerce and the Ministry of Disaster Management will work together to promote the insurance schemes for the SMEs, which are not covered under the NNDIP.

Sector Assessment Methodology

A systematic survey or an assessment has not been fully available for the study. Therefore the Team had to conduct a rapid ad-hoc survey to collect information from several sources i.e Banks, Chambers of Commerce, Trade Associations and insurance companies through the Insurance Board of Sri Lanka. The Team considers the data collected from insurance companies as being reliable though the coverage is low. Most insurance companies could only provide reported information relating to their customers in the industrial sector but could not provide full information relating their loss of output and revenue forgone. Therefore, the volume of losses had not been adequately captured in the report. Tea Exporters Association and some of the corporates in the beverage sector provided individual company information.

Ministry of Industry and Commerce just initiated a systematic survey of damages for the SMEs through the Divisional Secretariat divisions. However, the full information from this study was not available for the assessment. In addition, even though the format used by the Ministry carries a column on losses, information has not been received sufficiently for the losses, either because of unavailability of the information or poor awareness among the data collectors on the exact requirement of the format.

Informal sector information was not available, thus the approximations were made based on the baseline data on the informal sector collected during the Household survey and percentage of building affected due to flood situation.[65] This information was verified by conducting community consultations and field visits.

65 *Department of Census and Statistics, 2012. Household Income and Expenditure Survey 2012/13.*

Sector Reports

Infrastructure Sectors

Irrigation

Executive Summary

The PDNA for irrigation is part of the broader PDNA conducted for all sectors. It is a joint exercise of the Sri Lankan Government and development partners, and covers the irrigation, drainage and flood control infrastructure and facilities damaged by the May 2016 floods. It should be noted that the Government will not incur any revenue losses as no irrigation fees are levied and water for irrigation is provided as a full subsidy to farmers.

Therefore the damages for the sector are calculated based on the data and information collected and provided by the field staff of the Irrigation Department (ID), the Mahaweli Authority of Sri Lanka (MASL), the Department of Agrarian Development (DAD) and the Provincial Irrigation Departments (PIDs). The division of responsibilities among these sector agencies for the irrigation, drainage and flood control infrastructure is described in the main text of the report.

The net value of the total damages to the sector for Major and Medium Schemes maintained by the ID, MASL and the PIDs is estimated at LKR 1,723.2 million at pre-disaster prices.

The total damages (LKR 1,316.1 million) for Minor Irrigation Schemes, maintained by the DAD is also summarised in the text, however these values are excluded from the total of damages and losses, and in the recovery needs, as these damages, losses and recovery needs are addressed in the "Food Security, Agriculture, Livestock and Fisheries" chapter of this report, as this Minor Irrigation Scheme network falls within the jurisdiction of the Ministry of Agriculture. This chapter does however provide additional detail on the mechanisms of the Minor Irrigation Schemes in relation to the overall irrigation network in the country.

The Government plans to adopt a three stage approach to rectify the May 2016 flood damages: during the Short Term Stage (2016), the focus will be on urgent recovery activities; during the Medium Term Stage (2017-2018), the focus will be on large flood damage rehabilitation and improvement works underpinned by detailed hydrological and structural designs; and during the Long Term Stage (2018 onwards), the focus will be large scale flood risk mitigation interventions based on comprehensive basin wide flood risk mitigation assessments and robust and durable engineering designs. The estimated budget for the three stages are LKR 30 million, LKR 338 million and LKR 1,600 million for the short, medium and long term needs respectively. The recovery and implementation strategies are described in the main text.

Pre-disaster Context and Baseline

Irrigation plays a vital role in socio-economic development of Sri Lanka. More than 70 percent of the country's population lives in rural areas. A large majority of the rural population is engaged in agriculture as the main source of livelihood, mainly in rice production under irrigated conditions. The overall agriculture sector accounted for 10.7 percent of GDP and recorded a 4.7 percent growth in 2013 and irrigated agriculture contributed significantly to this growth.

The irrigation infrastructure serves a total command area of about 568,000 ha, which accounts for about 18 percent of the total land area under agriculture and about 8.7 percent of the total land area of the country. 90 percent of irrigated land is used to grow rice. In addition, cash crops are also grown under irrigated conditions. Sri Lanka is almost self-sufficient in terms of rice production and the rice production has been increasing steadily from 2.9 million tons in 2002 to 4.3 million tons in 2010 and 3.9 million tons in 2011.

Over the same period, the total harvested area has ranged from 700,000 to 1,100,000 hectares-of which an average of 75 percent is irrigated.

The irrigation infrastructure of the country is classified based on the designed command area served by the scheme: minor (small or village) scheme (command area less than or equal to 80 ha); medium scheme (more than 80 ha but less than 400 ha); and major (large) scheme (more than 400 ha). Major schemes are maintained by the Mahaweli Authority of Sri Lanka (MASL)[66] and the Irrigation Department (ID); medium schemes by the ID as well as by the nine Provincial Irrigation Departments (PIDs);[67] and the minor schemes by the Department of Agrarian Development (DAD).

The Sri Lankan irrigation infrastructure includes a combination of facilities, including large and medium sized reservoirs; small village tanks; diversion weirs (anicuts); feeder canals, trans-basin water conveyance canals; irrigation distribution canals and structures; and flood protection embankments; facilities for salt water exclusion from agricultural lands in coastal areas; and drainage canals.

About 340 major irrigation schemes feeding 288,000 hectares of farmlands and 21 flood control and drainage schemes serving 495,000 farm families are managed by the ID. Another 13 major zones feeding 104,000 ha and serving 180,000 farm families are managed by the MASL. In addition, there are nearly 34,000 working minor irrigation schemes scattered all over the country out of which 50 percent are nearly village tanks (small reservoirs) and balance 50 percent are water diversion weirs (anicuts). The command area under these systems is nearly 300,000 ha and 644,000 rural farming families depend on these systems as direct beneficiaries.

This infrastructure not only provides lifeblood for sustaining incomes and livelihoods of the rural population, but is also essential for domestic water use, flood and drought mitigation and control, recreation and miscellaneous environmental services. Typically reservoir and village tank embankments and irrigation canal embankments serve as link roads between villages and the main roads and markets. A majority of rural women generate incomes by engaging in manual wage labour for miscellaneous agricultural activities in the irrigation schemes. Therefore, the damage to the irrigation infrastructure would affect all these stakeholders.

Post-disaster Effects

Heavy rainfall and consequent releases of large volumes of water from reservoirs, over-topping of embankments, heavy run-off, and prolonged inundation of the canals and farm lands caused severe destruction to the irrigation and flood control infrastructure and resulted in deposition of silt in paddy fields. The typical damages includes the: scouring of embankments of several major reservoirs; scouring and breaching of the embankments of several village tanks; damages to diversion weirs/anicuts; erosion and washing away of canals and canal embankments, drainage canals and canal structures; and damage to farm access roads within the irrigation schemes. Banks of several major rivers such as Kelani, Kalu, Deduru Oya and Attanagalu Oya have eroded heavily at several locations too.

The 2016 floods affected the functionality and performance of the irrigation facilities in varying degrees in almost all the districts of the country. Of the 340 major irrigation schemes maintained by the ID, irrigation and flood control infrastructure and facilities of about 40 schemes have been affected by the floods. These irrigation and flood control facilities are in Anuradhapura, Colombo, Kurunegala, Monaragala, Puttalam

66 *The MASL is responsible only for the major schemes falling within the areas defined as "Mahaweli Areas" of the country. The ID is responsible for all the other major schemes of the country outside the Mahaweli area.*

67 *Interprovincial medium schemes, meaning that catchment, reservoir, and command area of the scheme cut across two provinces or more than, are maintained by the ID. Provincial medium schemes, meaning that the catchment, reservoir and the command areas lie within a single province, is maintained by the PIDs.*

and Vavuniya districts. However, only two small tanks linked with the Mahaweli Irrigation System H (major scheme) in Anuradhapura district, which are maintained by the MASL, were damaged.

Of the medium schemes maintained by the PIDs, irrigation and flood control infrastructure and facilities of about 44 schemes have been damaged by the floods. These damages are reported from Ampara, Batticoloa, Trincomalee districts (Eastern Province), Galle district (Southern Province), and Monaragala district (Uva Province).

Of the 30,000 minor irrigation schemes maintained by the DAD, irrigation facilities were affected as noted below:

- About 424 village tanks serving 6,180 ha and 9,900 farm families.
- 17 diversion weirs (anicuts) serving about 209 ha and 700 farm families.
- Canal systems serving about 4,877 ha and 8,432 farm families.

These damages have been reported from all the districts except from Ampara, Colombo, Gampaha, Monaragala and Nuwara Eliya districts. The breakdown of irrigation, flood control and drainage structures have affected farmers as they are faced with serious difficulties in receiving irrigation water, both on-time and in adequate quantities to irrigate their crops. Some of the farmers may not be able to cultivate crops in the forthcoming cultivation seasons successfully, unless the damaged infrastructure and facilities are restored.

The total estimated cost of the reported flood damages, without Minor Irrigation Schemes, to irrigation and flood control infrastructure of the country is LKR 1.723 billion. Since irrigation is an integral part of agriculture, these damages, if not rectified, would not only affect the functionality and performance of the infrastructure, but would also have adverse impacts on the agricultural production and farmers' income. Most of the small damages, which can be repaired by farmers themselves or within the regular maintenance budgets of the irrigation agencies, would not mean potential loss of crops in the forthcoming cropping seasons. However, some of the major damages, if not repaired and restored, would result in difficulties in delivering irrigation water to farms efficiently and eventually would mean potential loss of paddy crop in the forthcoming cultivation seasons, and the loss associated to this will be captured under the agriculture sector assessment. However, the Government will not incur any revenue losses as no irrigation fees are levied and irrigation water is provided as a full subsidy to farmers.

Summary of Damages and Losses

A summary of the reported damages at district level is as follows. As stated before, there are no losses to the Government as irrigation fees are not levied (full subsidy to farmers).

District	Damaged Infrastructure	Value (LKR million)
Major Schemes maintained by the Irrigation Department (See Annex 10. Industry and Commerce Sector for further breakdown)		
Ampara	Flood bunds, canals & roads	645.0
Anuradhapura	Headwork, canals & roads	185.0
Colombo	Flood bunds, gates and structures	70.0
Gampaha	Flood bunds, gates and structures	70.0
Kurunegala	Headwork, irrigation structures and roads	50.0
Monragala	Headwork and irrigation structures	40.0
Puttalum	Headwork, canals, structures, roads	320.0
Vauniya	Headwork, canals, structures	125.0
TOTAL FOR ID		**1,505.0**
Major Schemes maintained by the MASL		
Anuradhapura	Medium tanks	19.2
TOTAL FOR MASL		**19.2**
Medium Schemes maintained by the PIDs		
Ampara	Medium tanks, anicuts and canals	107.0
Batticoloa	Medium tanks and canals	23.1
Galle	Flood embankments and canals	6.1
Monragala	Canals	8.0
Trincomalee	Medium tanks and canals	55.0
TOTAL FOR PIDs		**199.2**
Minor Schemes maintained by the DAD		
Anuradhapura	Village tanks and anicuts	330.5
Badulla	Village tanks	17.5
Batticoloa	Canals	1.5
Galle	Canals	43.5
Hambantota	Village tanks	5.0
Jaffna	Village tanks and canals	415.6
Kegalle	Anicuts	1.1
Kurunegala	Village tanks	51.6
Mannar	Village tanks	30.0
Matale	Village tanks and anicuts	7.0
Matara	Canals	57.9
Mulativu	Village tanks	213.5
Pollonnaruwa	Village tanks and canals	26.7
Puttalum	Village tanks and anicuts	48.0
Ratnapura	Canals	13.6
Trincomalee	Village tanks	24.3
Vauniya	Village tanks and anicuts	28.8
TOTAL FOR DAD		**1,316.1**[68]
GRAND TOTAL (excluding DAD damages)		**1,723.2**

Table 52. Irrigation sector damages. Sources: Department of Irrigation, Department of Agrarian Development, Mahaweli Authority of Sri Lanka, and respective Provincial Irrigation Departments.

68 *The DAD damages are covered by the Agriculture sector, thus this information is mentioned only for reference here and not included in the grand total of the damages of the Irrigation sector.*

Impact Analysis on Development Goals

Sri Lanka has made substantial progress in economic development through the irrigated agriculture sector over the past decade, but faces significant challenges from flood related disasters to achieve sustainable development. As a tropical developing country with a significant poor population, Sri Lanka is highly vulnerable to flood damages in terms of physical as well as socio-economic impacts.

The irrigated agriculture sector needs to introduce adaptation measures, by considering the eradication of poverty in farming communities to help improve social development and promote a clean and healthy environment. The irrigated agriculture sector also needs to strike balance between environment conservation and economic development.

Cross-cutting Issues

Environmental damages occurred due to flash floods, with inundation during a number of days, soil and garbage deposits etc. The impacts of these events can badly affect public health, drinking water sources and surface water sources too. Given the inter-connected nature of water resources, there is potential for spill-over of these effects from the irrigation sector to other sectors, however, this is addressed in detail by the "Disaster Risk Reduction" chapter and also partly in the "Water and Sanitation" chapter of this report.

Women and their participation is critical for effectively managing disaster risk and designing, resourcing and implementing gender-sensitive disaster risk reduction measures and programmes and adequate capacity building measures need to be taken to empower women for preparedness as well as to build their capacity to secure alternate means of livelihood in post-disaster situations.

Recovery and Reconstruction Strategy

The general recovery strategy is to rectify the damages and restore performance of the damaged irrigation and flood control infrastructure as soon as possible, with the objective of minimising economic losses in the agriculture sector. The Government is currently rectifying the flood damages caused by the floods in 2010, 2011 and 2014 to the irrigation infrastructure through the on-going World Bank funded Climate Resilient Improvement Project (CRIP), implemented by the Ministry of Irrigation and Water Resources Management, which provides a US$152 million funding allocation. However, the available funds at present are not sufficient to cover the 2016 damages.

The Government would adopt a three-stage approach to rectify the 2016 flood damages.

Short-Term Stage (2016)

During the short-term stage, the focus will be on urgent recovery activities. This stage is the continuation of the Government's efforts to rectify the flood damages initiated immediately after the floods. In the aftermath of the floods, the ID and the DAD have attended to very urgent flood of a few major and minor schemes with the government annual budgetary allocations available with those irrigation agencies. Based on the preliminary needs assessment provided in this report, all the irrigation agencies would prepare a complete inventory of the damages together with reasonably accurate cost estimates for the repairs within a period of four months. A precise inventory of the damages will only be possible after the monsoon as new damages are expected to occur and some of the 2016 flood damages are likely to worsen during the monsoon season.

The inventory will categorise the flood damages into three major categories namely:

- **Category 1 :** Urgent flood damage repairs and temporary solutions in major, medium and minor irrigation and flood control infrastructure that are essential to ensure continued operation of the irrigation infrastructure and un-interrupted delivery of irrigation water to farms in the upcoming Maha cultivation season. These repairs will be the focus during the short-term stage (2016)
- **Category 2 :** Flood damages in major, medium and minor irrigation and flood control infrastructure that demand large scale rehabilitation and improvement works for sustained operation and functionality of the infrastructure but need detailed hydrological studies and structural designs and therefore would require extended time to undertake the rehabilitation and improvement works. This would include major rehabilitation and structural improvements to the damaged infrastructure and facilities. These flood damage rehabilitation and improvement works will be the focus during the medium-term stage (2017) (please see below); and
- **Category 3 :** Large flood damages, especially related with major irrigation and flood control infrastructure, that are likely to recur due to: a) complex hydrological inter-linkages of those infrastructure with the hydrology of the larger river basins; and b) flood risks posed by the operation of other hydraulic infrastructure in the basin on the concerned irrigation infrastructure, and will therefore require durable technical solutions to mitigate future flood damage risks. The interventions would include new structural and non-structural interventions. Structural interventions would include, for example, storage reservoirs, flood embankments, dikes, storm water drainage canals, access roads and road bridges, and also upgrading the existing infrastructure. Non-structural improvements would include, for example, watershed management and systematic operation of the reservoirs during floods, early warning systems etc. These flood damage rehabilitation and improvement works will be the focus during the long-term stage (2018-2020).

During this stage, detailed designs would be carried out for urgent flood damage repairs (Category 1) as well as for urgent temporary solutions for larger repairs and structural improvements (Categories 2 and 3) on fast track basis. Flood damage rehabilitation works will be implemented for those urgent works to the extent possible during the 2016 financial year using the funds available with the irrigation agencies.

In addition, detailed surveys, investigations and designs will be conducted for the Category 2 activities of the medium-term stage that would be included in the work plans and budget estimates of the irrigation agencies for the year 2017.

Medium-Term Stage (2017)

During the medium stage, the focus will be on large flood damage rehabilitation and improvement works underpinned by detailed hydrological and structural designs. Designs will be continued based on the application of state-of art hydrological modelling and structural design applications and methods. The Ministry of Irrigation and Water Resources Management (MIWWRM) is just beginning to revise the existing Technical Guidelines for the design of hydraulic infrastructure updating hydrological design parameters and hydrological data and incorporating the modern hydrological modelling tools and structural design methods and applications. In addition, the MIWRM plans to provide hands on training to the engineers of all the irrigation agencies on the application of the revised technical guidelines.

Long-Term Stage (2018-2020)

The focus during this stage will be large-scale flood risk mitigation interventions and needs triggered by the 2016 floods.

At present the MIWRM, under the on-going CRIP, has initiated a comprehensive analytical study on flood risk modelling in eleven river basins of the country.[69] A major output of this study would be the identification of detailed feasibility level designs for structural and non-structural interventions to mitigate flood (and drought) risk in the eleven basins and based on these, the development of basin wide long-term investment plans.

This study is being carried out using the best international modelling techniques and tools by a team of international consultants and a counterpart technical staff of the MASL and the ID. Almost all of the Category 3 flood damages that occurred in 2016 would fall within these 11 river basins. Therefore, Category 3 damages will be studied in greater detail within the concerned basin-wide modelling studies in order to find out durable technical solutions and non-structural interventions to mitigate future flood damage risks. As the funding is already available for the study, no additional funding will be required for the detailed studies and designs. However, once the basin investment plans are finalised by the Government with the identification of priorities, funding will be required to undertake those interventions. The actual costing as well as the implementation arrangements for this Category of works would be decided upon later after the completion of the basin investment plans.

Recovery and Reconstruction Needs with Costs

Based on this strategy the proposed budget requirements for the flood damage recovery will be as follows:

Type of Irrigation and Flood Control Infrastructure	Total Damage (LKR Million)	Short-term (LKR Million)	Medium Term (LKR Million)	Long Term (LKR Million)[70]
Major Schemes				
Irrigation Department	1,505	0.00	150	1,400
Mahaweli Authority of Sri Lanka	19	0.00	19	200
Medium Schemes				
Provincial Irrigation Departments (Uva, Eastern, and Southern Provinces)	199	30	169	0.00
Minor Schemes				
Department of Agrarian Development	Recovery costs reflected in the "Food Security, Agriculture, Livestock and Fisheries" sector report			
TOTAL	**1,723**	**30**	**338**	**1,600**

Table 53. Irrigation recovery and reconstruction needs.

Implementation Strategy for Recovery

Short-Term : The responsibility for planning, designing and executing the flood damage repairs, rehabilitation and major improvement works will be with the concerned irrigation agency as described above. However, there is an exception that if any flood damage repairs and/or structural improvement to a minor scheme require specialised technical skill, then the DAD would request the concerned PID to carry out such works. The irrigation agencies will use the annual operation and maintenance budget to carry out very small flood damage repairs. The irrigation agencies will also entrust flood damage repairs not exceeding an estimated cost of LKR 2 million per any single works item to registered local farmers organisations on standard community contracting arrangement. Such works would be guided and supervised by the technical staff of the irrigation agencies. The farmer's organisations are expected to organise local farmers as wage labourers to carry out repairs and rehabilitation works in the damaged irrigation systems.

69 The 11 basins are Lower Mahaweli Ganga; Malwathu Oya; Maha Oya; Deduru Oya; Kelani Ganga; Attanagalu Oya; Kala Oya; Gin Ganga; Nilwala Ganga, Gal Oya, and Mundeni Aru.

70 Tentative provisions, which will change after the preparation of a more precise inventory of flood damages with the completion of the on-going flood modelling studies of the eleven river basins

For the execution of repairs, rehabilitation and improvement works that require specialised technical supervisory inputs and skills, the irrigation agencies will employ skilled contractors to carry out such repairs under the technical guidance of the engineering staff. For lighter repairs that will not require heavy skills, the irrigation agencies will engage registered farmers' organisations of the concerned irrigation schemes as contractors following the standard community contracting rules and procedures of the Government. This approach will enable the implementation and completion of the urgent repairs quicker.

The Government rules applicable to the irrigation agencies would not allow "cash for work" procedure to carry out flood damage repairs.

Based on the other priority activities identified in the inventory and those that can be completed during 2017 and 2018, provisions will be included in the annual budget estimates of the irrigation agencies that would be submitted to the Treasury for seeking funds for flood damage repairs in 2017.

No additional funding would be required by the ID and the MASL for short term interventions as those would be undertaken within the already available annual funding provision in 2016 to these two irrigation agencies for operation and maintenance as well as flood damage repairs. However, limited funding will be required by the DAD and the three PIDs to undertake urgent repairs.

Medium Term : For the execution of repairs, the irrigation agencies will employ skilled contractors to carry out such repairs under the technical guidance of the engineering staff.

Long Term : As stated, the actual costing as well as the implementation arrangements for this Category of works would be decided upon later after the completion of the basin investment plans.

Sector Assessment Methodology

The assessment was based on the data collected from the national level agencies responsible managing major medium and minor irrigation schemes. The ID, responsible for managing major irrigation schemes, has its regional offices in all districts, headed by a Regional Director, and there is also a Divisional Irrigation Engineer for each major irrigation scheme. The flood damages on the major irrigation schemes were initially assessed at the divisional irrigation engineers' office and subsequently these damage estimates were validated by the regional director's office and sent to the ID head office in Colombo. A team of senior engineers from ID carried out field visits in Neelabemma scheme in the Puttalam district and the Colombo flood protection scheme to validate the estimates prepared by the field offices. Similarly, the Agrarian Development Department carried out damage assessment on the minor irrigation schemes at district level and this was validated by the engineers at the head office. The damages to the medium irrigation schemes were not widespread and these damages were assessed by the Provincial Irrigation Offices. The assessment team collected the damage data on medium schemes from the Ministry of Provincial Councils and Local Government.

Water and Sanitation

Executive Summary

The focus of water and sanitation sector was mainly on five districts: Colombo, Gampaha, Kegalle, Ratnapura and Puttalam, depending on the severity of sector related issues in the backdrop of socio economic and demographic sensitivities.

Based on preliminary situation reports the analysis on damages, losses and needs were confined to the sub-sectors of water and sanitation. The water schemes of National Water Supply and Drainage Board, water schemes managed by community (Community Based Organisations-CBOs), and dug wells were considered under Water. The sanitation subsector considered household toilets. Cost of overall damages was found to be LKR 366.62 million, mostly contributed by inundated dug wells and toilets, while the total cost of losses reached LKR 76.52 million. The five districts were found with water and sanitation related recovery and reconstruction needs reaching to a total of LKR 670.1 million, out of which 31 percent is for medium term interventions while 63 percent is for the long term interventions. While Colombo was leading in financial damages and losses with 50 percent of the overall damages, Kegalle was found much critical in terms of financial needs sharing 76 percent of the total needs. Some of the needs are being materialised with both government funding and external support.

It was seen that the impacts of the disaster vary with the socio economic status of the affected population. The middle class are more concerned of the recovery of capital cost of the damaged water and sanitation assets while the deprived communities would find their basic needs to be further compromised with the sector's effort to recover stretching its resources. Furthermore the aftermath of the disaster shows the need of counting sensitive and marginalised groups such as children, adolescent girls, elders, mothers and differently abled in planning water and sanitation services. Post disaster developments have influenced both professionals and community to revisit their attitudes and roles related to water and sanitation services in the backdrop of increasing natural disasters. The analysis clearly highlights the need of medium to long term strategies for the sector to become disaster resilient together with necessary capacity built in human resources and system work flows. It further flags the need of solid multi stakeholder approaches involving environment and community aspects more in the sectoral plans. The sector lead as well as stakeholders may require to make disaster risk management part of the regular sector agenda when moving forward with the identified recovery and reconstruction initiatives.

Pre-disaster Context and Baseline

Geographical Focus

While intense rainfall affected 22 districts, the water and sanitation chapter of PDNA assessment focusses on five priority districts with 47 divisional secretary areas in-line with the Situation Report from the Disaster Management Centre (DMC) updated on 22 May 2016. The districts include Colombo (9 divisions), Gampaha (9 divisions), Kegalle (11 divisions), Ratnapura (17 divisions) and Puttalam (1 division).

The selection of these districts were based on the number of affected people, proportion of affected population, severity and extent of disaster and complexities in responding to the disaster, specifically the recovery of water and sanitation infrastructure and services. In the Puttalam District only one major issue was reported, while the Anuradhapura District was not counted as post disaster water and sanitation related issues were not reported there as a major concern. Yet those seemed to be addressed under irrigation related response due to the unique agricultural base of this district where a considerable percentage of population uses irrigation water for domestic uses.

Water

The Water sub-sector analysis was largely based on drinking water due to its implications on public health when either accessibility or quality is compromised. Considering the prevalence of service, public demand, and existing quality assurance mechanisms, the following categories of water sources were included in this analysis.

i. Pipe borne water by the National Water Supply and Drainage Board (NWS&DB).
ii. Pipe borne water by Community-Managed Water Schemes.
iii. Dug wells (household and common).

The NWS&DB caters to approximately 32 percent of Sri Lanka's total drinking water supply and 76 percent of pipe borne water supply. It has 324 water supply schemes using various water sources treated with both conventional and customised processes. The NWS&DB services are managed by professionals and subjected to consistent quality assurance covering both treatment and distribution.

More than 4,000 community-managed water schemes cover approximately 10 percent of Sri Lanka's total water supply, representing 24 percent of the total pipe borne water supply. These schemes are managed by Community Based Organisations consisting of non-professionals with only basic knowledge on operations and maintenance. Quality assurance is not consistent and adequate in these schemes in general.

Dug wells provide the largest contribution to Sri Lanka's drinking water supply with a coverage of 51 percent. A vast majority of them are owned by individual households and the remainder function as common amenities. Dug wells are mainly categorised as protected and unprotected depending on the availability of a guard wall and/or an apron around it. Regardless of this categorisation, there is no consistent quality assurance of water from dug wells unless opted for by the owner as a part of post-disaster rehabilitation. Due to this critical factor, dug well owners are always advised to use an appropriate household water treatment such as boiling or adding chlorine tablets at least to address microbial risks.

Both the NWS&DB and CBO managed schemes as well as protected dug wells are categorised as 'improved water' sources, while unprotected wells are categorised as 'unimproved water' sources. The coverage of 'improved water' sources in the five focal districts is shown in Table 54 below.

	Dug Wells (%)			National Pipe Network (%)			Other Sources (%)						
District	Protected well within premises	Protected well outside premises	Unprotected well	Tap within the unit	Tap within the premises but outside the unit	Tap outside premises	Rural water supply project	Tube Well	Bowser	Bottled Water	Surface water	Improved water %	Unimproved water %
Colombo	21.7	2.1	1.3	62.7	4.8	3.3	3.1	0.3	0	0.1	0.5	98.1	1.9
Gampaha	53.7	7.1	2.5	20.5	4	2.6	3.2	5.5	0.1	0.1	0.7	96.7	3.3
Kegalle	31.4	19.6	7.8	13	3	1.7	11.2	0.3	0	0	12	80.2	19.8
Ratnapura	17.7	13.2	5.2	10.1	8.4	4.5	26.2	1.5	0.4	0	12.9	81.6	18.4
Puttalam	28.4	16.9	2	8.4	5.8	2.4	10.8	16.9	2	1.6	5	91.2	8.8

Table 54. Drinking water coverage in focal districts. Source and calculation base: Census 2012 Sanitation.

Sanitation sub-sector analysis was mainly based on household latrines, with a particular focus on both access to and disposal of excreta. The damages to the latrine (accessibility) are often apparent, while the damages to excreta disposal systems (mainly septic tanks and soakage pits) remain concealed leading to long term hazards. The five priority districts report high coverage of improved excreta disposal methods, mainly poor flush latrines with septic tanks and/or soakage pits while piped sewerage is confined to Colombo Municipal Council area. The prevalence of pit latrines is negligible. Table 55 below summarises these aspects for each of the focal districts.

District	Within the housing unit (%)		Outside the housing unit (%)		Other (%)				
	Dedicated to Household	Shared	Dedicated to Household	Shared	Shared with other housing units	Common/Public	Not using latrine	Improved Sanitation %	Un-improved Sanitation %
Colombo	69.4	2.6	19.7	4.1	0.8	3.3	0.1	89.1	10.9
Gampaha	48.5	3	38.9	7.6	1.5	0.2	0.1	87.4	12.6
Kegalle	26.1	1.5	64.3	5.1	2.3	0.2	0.5	90.4	9.6
Ratnapura	20.8	2.1	65.8	7.5	3	0.2	0.5	86.6	13.4
Puttalam	23.6	2	60.9	6.6	3.1	0.6	3.2	84.5	15.5

Table 55. Sanitation coverage in focal districts. Source and calculation base: Census 2012.

Hence this analysis mainly focused on ***household latrines*** (both non-shared and shared) with onsite excreta disposal system such as septic tanks and/or soakage pits, standalone pits and cesspools. However, it should be noted that the statistics do not cover the type and status of excreta disposal system of latrines.

Both water and sanitation sub-sectors comprise sub-categories, such as urban, rural and plantation areas, where socio economic factors are to be considered in recovery strategies and long-term development.

Water and Sanitation Infrastructure Baselines

National census data on water and sanitation, as well as operational data from the NWS&DB, were used in deriving baseline information for the pre-disaster context in the five focal districts under the selected categories, as shown in Table 56 and Table 57 below.

District	Pipe Borne (#) (Source-NWS&DB)		Dug Wells (#) (Source & calculation base-Census 2012)					
	NWS&DB Schemes	Community Managed Schemes	HH Wells	Common Wells (assuming 5 households sharing 1 well)		Total Protected Wells	Total Unprotected Wells	Total Wells
			Protected, in Premises	Protected, Outside	Un-protected			
Colombo	11	174	121,297	2,372	1,405	123,669	1,405	125,075
Gampaha	21	208	318,577	8,369	2,934	326,946	2,934	329,880
Kegalle	09	204	68,562	8,548	3,419	77,110	3,419	80,529
Ratnapura	09	405	49,538	7,392	2,901	56,930	2,901	59,831
Puttalam	08	112	57,019	6,782	7,580	63,801	7,580	71,381
	58	**1,103**						**666,695**

Table 56. Pipe borne water and dug well baseline data in focal districts.

District	Toilets (#) (Source & calculation base-Census 2012)								
	Individual Household Toilets		Shared Toilets (assuming 2 households sharing 1 toilet)		Shared Toilets (assuming 5 households sharing 1 toilet)		Total Individual Household Toilets	Total Shared Toilets	Total Toilets
	Within House	Outside House	Within House	Outside House	Outside House	Public Toilets			
Colombo	387,843	110,189	7,265	11,358	932	3,649	498,032	23,203	521,235
Gampaha	288,017	231,090	9,006	22,614	1,758	281	519,107	33,659	552,766
Kegalle	57,109	140,521	1,653	5,546	988	74	197,630	8,260	205,890
Ratnapura	58,261	184,632	2,932	10,543	1,705	136	242,893	15,316	258,209
Puttalam	47,407	122,352	1,972	6,622	1,250	232	169,759	10,076	179,835
									1,717,935

Table 57. Household toilet baseline data in focal districts.

Post-disaster Effects

This narration focuses on community level water and sanitation services using the categorisation described in the above pre-disaster context. The component on water, sanitation and hygiene in schools has been addressed in the chapter on Education. Each category is explained with respect to the following dimensions: infrastructure and assets; effects on service processes and accessibility to services; effects on sector governance, functions and systems and increased risks and vulnerabilities.

NWS&DB Water Schemes

While there was some damage to NWS&DB's water schemes due to flooding, there was no noticeable interruption of services. While regular consumers could not reach services due to floods, they were given alternatives and no critical gaps in access to services were reported. Most of the damages reported were to the water intakes built along rivers and streams. Borehole intakes have also been damaged due to inundation. The heavy load of mud and silt as a result of the landslides in Kegalle district had damaged and blocked the intakes of water systems in NWS&DB surrounding water schemes resulting in temporary shut off and extensive cleaning. In addition, the floods had destabilised the distribution networks of several schemes. Due to timely precautions undertaken by the NWS&DB, the risk of pump houses and critical structures being inundated, was prevented, especially in NWS&DB managed Ambatale and Kelani Right Bank water treatment plants.

Since the onset of the disaster, the NWS&DB have been utilising their regular and additional resources to provide uninterrupted services to affected people in all districts, even going beyond their regular services and functioning as a technical expert body. Immediate recovery and cleaning campaigns managed to restore the functionality of all vulnerable schemes. Temporary water supply with water trucking and temporary storage facilities were provided to cater for the increased water demand from both displaced and regular consumers mainly for domestic cleaning after flooding. The assistance provided by UNICEF and other donors by urgently supplying PE tanks and assistance from the military and DMC to provide water trucks was noteworthy. NWS&DB also provided water by trucks to military and others involved in the cleaning operations of households inundated by floods in Colombo and Gampaha districts. The heavy rains resulted in increased dissolved solids and microbial pollutants in all surface water sources compelling the NWS&DB to invest more on Turbidity removal and disinfection in their conventional treatment plants.

The subset of affected people waiting for permanent relocation in landslide prone areas of Kegalle and Ratnapura districts is a unique caseload. Hilly terrain and sensitive socio-economic factors have compelled the NWS&DB to find customised medium term solutions beyond water trucking, particularly in Kegalle. These mainly consist of installation of interim water schemes with on-site treatment options and new distribution lines. The NWS&DB catered to this caseload with the support of UNICEF and OXFAM, as well as German and Denmark expert disaster management teams.

The floods compromised the NWS&DB's routine revenue since the affected urban communities were offered an extended timeframe for monthly bill settlement considering the extensive water use in domestic cleaning and the loss of income during this disaster of the low-income households. Further concessions will be granted for the water wasted during the emergency due to damages to the internal plumbing systems and fixtures, on a case by case basis. In addition, due to relocations of people some consumer bases are no longer available. Support from external agencies to the NWS&DB's emergency response and immediate recovery was largely supply-based, covering both material and service costs, while operational and staff costs were contributed by the NWS&DB's own resource pools and voluntary inputs from the staff from unaffected districts. The large number of leaks in the localised small water distribution systems due to floods, and the inability to detect them until the receding of floods, have increased the water losses even though additional resources were mobilised.

The NWS&DB now have to address medium and long term needs, including strengthening the resilience of their water intakes, repairing and extending pipe networks and establishing onsite water treatment with delivery and storage options. In this context, there is also a need to improve their capacity in disaster response and recovery, mainly on field water quality assurance, mobility in hard-to-reach terrains and additional knowledge and skills development. UNICEF is currently supporting the NWS&DB to address some of these capacity gaps.

The NWS&DB was implementing the WHO's Water Safety Plans (WSPs) in their schemes prior to the disaster with technical and financial support from WHO and UNICEF. The WSPs have a dedicated focus on managing emergencies, in addition to preventive and resilience building measures, which is a sustainable option in mitigating disaster risks. In addition, there has been several initiatives to use Integrated Water Resource Management (IWRM) for catchment and river basins such as that of the Kelani River, one of the major water sources of the NWS&DB. These initiatives could be used to further reach and strengthen long-term solutions for managing disaster risks.

Community-Managed Water Schemes

Given the institutional framework of these schemes is still emerging, monitoring the condition of these schemes after the disaster has been a challenge. To-date, only one scheme is reported having medium to long-term damages. Both the Department of National Community Water Supply (DNCWS) and Rural Water Supply (RWS) Unit of the NWS&DB are engaged in following up on disaster-related damages and losses of these schemes. Since each scheme is unique with its own community base, most of the post-disaster issues have been managed by the community leaving only the more critical issues for external analysis.

Due to their scattered locations and diverse nature of technology and community administration of these schemes, the existing institutional capacity of the NWS&DB is not adequate to cover a comprehensive post-disaster analysis. Hence, the best option appears to be the continuation of institutional plans already in place before the disaster while expanding the use of rural WSPs. WSPs, being a preventive approach, would contribute to building the resilience of these schemes, empowering communities to manage the risks themselves. Initiations in this regard are on-going by the RWS and DNCWS, with technical and financial support from WHO, UNICEF and World Bank.

Dug Wells

As the most common water source in the country, dug wells have been the most affected, although underreported, by the disaster. Both protected and unprotected dug wells immediately become unusable after a flooding due to inundation of water carrying all sorts of pollutants, including microbial, chemical and physical. In cases of protected wells, severe and agitated floods always destabilise the guard walls and aprons compromising their accessibility in a post disaster context. Wells, largely being personal/domestic properties and very high in numbers, do not get assessed in-depth following a disaster. Instead, authorities offer standard well cleaning support to make them serviceable. These same issues were present in the recent flood disaster as well. Therefore, national census data and disaster related situation reports were used to estimate the extent of damages.

Medical Officers of the MoH and Public Health Inspectors (PHIs) were the first line of support in making the wells serviceable, mainly technically coordinating dewatering and shock chlorination. In more hardware-oriented cases, special teams from the military, NWS&DB and other voluntary groups undertook the dewatering component. In addition, local authorities also played a role in this. The urgent assistance provided by UNICEF with dewatering pumps was very effective for this operation. In spite of this standard cleaning, most vulnerable communities were also provided with water purification tablets (Aqua Tabs) as on-site treatment of well water until people start using their regular household treatment options or other safe water options. The Ministry of Health (MinoH) undertook a countrywide campaign of well cleaning and secondary onsite treatment with the support of UNICEF supplying 500,000 Aqua Tabs and 13 tons of chlorine powder.

Rehabilitation of damaged protected wells, as well as provision of basic infrastructure to unprotected wells, remain a major need. This infrastructure (guard wall, apron and internal lining) mainly makes wells accessible while limiting physical contamination to some extent. However, it does not assure water safety against microbial or chemical contamination, thereby requiring the need for public health promotion on household storage and treatment. While traditionally such initiatives are not included in disaster recovery, these measures empower communities to protect themselves against water borne health hazards from contaminated wells in future disasters.

Household toilets

Similar to dug wells, household toilets were vulnerable to damages during the flooding. While the damages to latrine superstructure (compartment) were highly visible, long-term hazards from damaged excreta disposal system was less visible. This resulted in more attention and resources (by the owner or from external source) towards latrine rehabilitation, as opposed to excreta disposal systems concealed underground. Household toilets are not assessed systematically; therefore, as was the case for dug wells, estimation of damages was done using census data and disaster situation reports.

Sri Lanka's household latrines should have a septic tank for excreta disposal, which should be water sealed and linked to a soakage pit. However, a vast majority of septic tanks are not designed in this way, are structurally weak and not water sealed, similar to a standalone soakage pit/cesspool. Data to verify these concerns are not available. Inundated septic tanks immediately become a pathogenic pollutant source, as its sludge will be carried away by floodwater. More critically, once the floodwater recedes people are unaware of structural damages and the septic tanks become long-term sources of ground water pollution with live pathogens causing immediate risk to dug well users.

Since inundated septic tanks are not given priority during the immediate response phase, stabilisation of those got structurally weakened remains both a recovery and long term need. UNICEF is currently working with the MoH to replace damaged septic tanks in most vulnerable households. This exercise needs to be mainstreamed both as a public health and resilience building priority.

Water and sanitation facilities in schools were of a concern during the disaster for two reasons. Some of those also had incurred damages and losses (counted under the Education sector) yet most importantly they were utilised heavily during the emergency response, as schools were the first option to house temporarily displaced and evacuated communities. Hence the quality, quantity as well as child and disable sensitivity of the school water and sanitation was much apparent hence to be counted in recovery and reconstruction by the respective sectors/stakeholders.

Summary of Damages and Losses

Water services damages and losses had more or less been documented and thus could be tracked and derived. However damages to household wells and latrines had not been documented hence derived by superimposing DMC affected population data over census 2012 water and sanitation coverage data. To ensure the credibility of this estimation the data analysis was done at divisional secretariat level. Accordingly this analysis of damages and losses associates with the number of infrastructure as summarised in Table 58.

District	NWS&DB Water Schemes	Community Water Schemes	Dug Wells		Toilets with Septic Tank
			Protected	Un Protected	
Colombo	-	-	5,703	140	49,090
Gampaha	-	-	7,651	34	16,415
Kegalle	8	1	2,634	144	8,501
Ratnapura	-	-	1,424	50	5,667
Puttalam	-	1	-	-	-

Table 58. Infrastructure Statistics used for Costing Damages, Losses and Needs.

Table 59 and Table 60 below summarise the damages and losses in the focal districts under both the water and sanitation sub-sectors in line with the pre and post disaster context described above.

District	Summarised Description of Damages	Estimated Cost of Damages (LKR million)		
		Public	Private	Total
Colombo	Protected Dug wells-Structural damages and water contamination		34.22	34.22
	Unprotected Dug wells-Erosion and water contamination		10.51	10.51
	Toilets Compartment-Structural damages		147.27	147.27
Sub Total of damages in Colombo district				**192.00**
Gampaha	Protected Dug wells-Structural damages and water contamination		45.91	45.91
	Unprotected Dug wells-Erosion and water contamination		0.27	0.27
	Toilets Compartment-Structural damages		49.25	49.25
Sub Total of damages in Gampaha district				**95.43**
Kegalle	NWS&DB-Damages to water intakes	0.50		0.50
	NWS&DB-Damages to distribution network	0.30		0.30
	Protected Dug wells-Structural damages and water contamination		15.80	15.80
	Unprotected Dug wells-Erosion and water contamination		1.15	1.15
	Toilets Compartment-Structural damages		25.50	25.50
	Community Water-Damages to impounding reservoir bund	5.00		5.00
Sub Total of damages in Kegalle district				**48.25**

District	Summarised Description of Damages	Estimated Cost of Damages (LKR million)		
Ratnapura	Protected Dug wells-Structural damages and water contamination		8.54	8.54
	Unprotected Dug wells-Erosion and water contamination		0.40	0.40
	Toilets Compartment-Structural damages		17.00	17.00
Sub Total of damages in Ratnapura district				**25.94**
Puttalam	Community Water-Damages to impounding reservoir bund	5.00		5.00
Sub Total of damages in Puttalam district				**5.00**
Total Damages (LKR million)		**10.80**	**355.82**	**366.62**

Table 59. Water and Sanitation damages.

The following assumptions were made in estimating losses pertaining to household dug wells and toilets;

- All wells were cleaned with basic dewatering and/or shock chlorination
- Only 25 percent of affected septic tanks were dislodged

District	Summarised Description of Damages	Estimated Cost of Damages (LKR million)		
		Public	Private	Total
Colombo	Provision of water during displacement (by NWS&DB)	3.15		3.15
	Dewatering and cleaning of wells (by MoH/NWS&DB/Owners)		11.69	11.69
	Desludging septic tanks (by Authorities/Owners)		24.55	24.55
Sub Total of losses in Colombo district				**39.39**
Gampaha	Provision of water during displacement (by NWS&DB)	2.64		2.64
	Dewatering and cleaning of wells (by MoH/NWS&DB/Owners)		15.37	15.37
	Desludging septic tanks (by Local Authority)		8.21	8.21
Sub Total of losses in Gampaha district				**26.22**
Kegalle	Provision of water during displacement (by NWS&DB)	2.40		2.40
	Dewatering and cleaning of wells (by MoH/Owners)		5.56	5.56
Sub Total of losses in Kegalle district				**7.96**
Ratnapura	Dewatering and cleaning of wells (by MoH/Owners)		2.95	2.95
Sub Total of losses in Ratnapura district				**2.95**
Total Damages (LKR million)		**8.19**	**68.33**	**76.52**

Table 60. Water and Sanitation losses.

Impact Analysis on Development Goals

Prior to the disaster, the water sector was moving towards water safety based on WHO's WSPs, as a key initiative in-line with the Sustainable Development Goals (SDGs), by establishing surveillance of water supply from catchment to consumer. The aftermath of the disaster highlighted the need for WSPs at both the level of the service provider and household. Post disaster actions have the potential of sustaining the water safety agenda, with particular attention on disaster risk reduction in catchments and river basins, through a multi stakeholder management mechanism. It also highlights the need for a comprehensive Emergency Preparedness and Response capacity and mechanism for NWS&DB to better manage such situations. Furthermore, the damages to dug wells have highlighted the need to increase public knowledge, attitudes and practices on water safety in general and household water treatment options.

There has been an on-going exercise to formulate Sri Lanka's first-ever Sanitation Policy, which has an extensive focus on environmentally friendly sanitation. The gaps in knowledge, technology and system

related to excreta management, particularly at domestic level, identified after the floods could contribute towards the formulation of proper guidelines and stakeholder accountability.

While the country has good coverage rates of water and sanitation, the disaster exposed vulnerabilities in the system, which led to major deprivations for those living in affected areas. Those most vulnerable, including children, women, elders, people with disabilities, etc., faced significant difficulties from limited access to safe water and adequate sanitation services. Children under five were most at-risk, while women and adolescent girls faced issues from the lack of privacy and dignity in such circumstances.

In both urban and rural areas, some of the affected families from more middle-income backgrounds, who, over the years, had invested in quality household water and sanitation commodities, are unable to replace these facilities in the near future due to their limited resources. However, these families are not typically targeted in humanitarian responses given their family status and government prioritisation of meeting the basic needs for those most affected, particularly families that have to be relocated. This has caused discomfort and stress within these families, particularly amongst children and the, already vulnerable, elderly population.

Overall, the disaster has triggered renewed thinking amongst relevant stakeholders on improved strategies for service delivery and operational work flows in times of a disaster, particularly given the public agitation over issues related to safe water and adequate sanitation facilities. The disaster has also created a new demand for investing in quality infrastructure and services that can withstand the adverse effects of natural hazards. This demand to be more resilient in water and sanitation will be reflected in budget and human resource allocations within the sector, as well as at household level.

Cross-cutting Issues

Environment : Both the floods and landslides have clearly raised the profile of Integrated Water Resource Management, as well as Catchment/Water Shed Management, as non-negotiable sub-sectors towards a sustainable future. Investment on infrastructure alone would not withstand the mounting disaster risks unless these sub-sectors are adequately integrated into water supply. In addition, the need for professional septage management at local authority level is evident together with the required disposal sites and transport facilities in place. Furthermore, the need for alternative and innovative sanitation, such as ECOSAN (composting latrines), constructed wetlands and sophisticated vacuum-based sewage systems, may need to become part of the way forward. Most importantly, the scenario has highlighted the need for systematic coordination, defined accountabilities and convergence between water, sanitation, health, local governance and environment sector stakeholders.

Disability : The need to review accessibility of water and sanitation services by those with disabilities has been highlighted during the recent disaster. The temporary camp locations, such as schools, religious places etc., did not have provisions for people with disabilities. However, such considerations have been made in planning temporary and semi-permanent water and sanitation facilities.

Gender : Gender segregated sanitation facilities have become a norm in Sri Lanka. However, a stronger focus on gender considerations need to be made when providing water and bathing facilities during the emergency response. Particularly the needs of lactating and expecting mothers, as well as adolescent girls, have to be explicitly reflected in disaster management mechanisms in the sector.

Disaster Risk Reduction : Public knowledge and attitudes on DRR aspects of both water and sanitation have become a matter of concern. Resource allocation for resilient infrastructure and systems as well as

retrofitting have not yet been recognised as an investment and long term saving. The disaster has highlighted the need for improved water and sanitation infrastructure designs, both large scale and domestic, with a cost-benefit analysis.

Emergency Preparedness and Response Capacity/Mechanism : It is evident that water and sanitation service providers and stakeholders need to build their internal capacity and mechanisms in this regard. Apart from financial resources, there is a need for adequate allocation of human resources and staff time combined with greater orientation and assessment tools. Introduction of global standards such as SPHERE and formulating corresponding local norms would be a good starting point.

Recovery and Reconstruction Strategy

Multi Sectoral Platform : Strategies for water and sanitation should not be standalone but must be formulated in line with and complementing the strategies of other converging sectors such as health, nutrition, housing, environment and irrigation.

Context Specific Approaches : The recent disaster clearly highlighted different caseloads of affected communities that need customised water and sanitation strategies as summarised in Table 61 below:

Strategic Timeframe	Target Caseload of Affected Population	Proposed Strategies
Short to medium term	• Rural population subjected to long term displacement in temporary/transitional shelters. • Urban population whose septic tanks had been inundated.	• Investing in interim water supply based on mobile/onsite technologies. • Mainstreaming child, disabled and gender sensitive temporary/ transitional WASH infrastructure designs. • Using precast septic tank technology.
Medium to long term	• Urban/rural population with water from a piped network. • Rural population with water from a dug well. • Rural population permanently relocated.	• Improving the capacity of field water quality testing. • Improving mobile repair and restoring capacity of piped water. • Field testing child, disabled and gender sensitive permanent infrastructure designs. • Introducing comprehensive dug well cleaning guidelines. • Introducing water, sanitation and hygiene centred disaster management and resilience building concepts and skills to at least vulnerable schools. • Building emergency preparedness and response capacity in services. • Improving DRR aspects of infrastructure and services making them resilient to predicted disasters. • Empowering the emergency response capacity within Water Safety Plans. • Enhancing the septate management capacity of local authorities.
Long term	Population living within catchments, river basins and sensitive reservations	• Mainstreaming integrated water resource management. • Mainstreaming land use planning. • Promoting awareness on environmental sustainability. • Facilitating consultative relocation process planning. • Upgrading the school curriculum with the basics of water safety, environmental sanitation and environmental sustainability.

Table 61. Water and Sanitation recovery and reconstruction strategies.

Sector Coordination : Disaster Risk Management (encompassing pre, onset and post emergency context) and Emergency Preparedness and Response Capacity/Mechanism to become a permanent agenda item of the national WATSAN steering committee meeting convened by the Ministry of City Planning and Water Supply together with NWS&DB. This forum may be extended towards forming multi-sectoral platforms to materialise long-term strategies for Integrated Water Resource Management with particular attention to catchments and river basins. Convergence between water and health sectors may be further strengthened under the Water Safety Plan framework through District Water Quality Surveillance Committees to cater to disaster related issues pertaining to household water and sanitation facilities.

Recovery and Reconstruction Needs with Costs

Table 62 summarises the short, medium and long term financial needs in materialising the strategies. The following assumptions were made in estimating needs pertaining to household dug wells and toilets:

- All un protected wells need to be rehabilitated.
- 5 percent of affected toilet compartments are beyond recovery hence to be reconstructed.
- 5 percent of affected septic tanks are beyond recovery hence to be replaced with pre-fabricated septic tank and soakage pit package.

Recovery/Reconstruction Initiatives	Short	Medium	Long
Provision of interim water supply to transitional locations in Kegalle	20.0		
Provision of interim sanitation facilities to transitional locations in Kegalle	20.0		
Replacement of damaged septic tanks of vulnerable households in Colombo and Gampaha		82.0	
Provision of permanent water supply to finalised relocations in Kegalle	1.5	37.6	422
Structural rehabilitation of damaged dug wells in Colombo & Gampaha		13.0	
Improving household water treatment capacity (supply of filters) in Colombo, Gampaha, Kegalle and Ratnapura (8,000 households)		32.0	
Improving field water testing capacity of NWS&DB (testing and mobility)		28.0	
Rehabilitation of two damaged community managed water schemes in Kegalle and Puttalam		10.0	
Water/sanitation stakeholder orientation on disaster risk management		4.0	
Total (LKR million)	**41.5**	**206.6**	**422**
		670.1	

Table 62. Water and Sanitation recovery and reconstruction needs.[71]

71 *Reconstruction of household sanitation facilities is counted under the housing chapter.*

Implementation Strategy for Recovery

Table 63 summarises the components of implementation strategy in materialising the recovery/reconstruction initiatives reflected in Table 62.

Recovery/Reconstruction Initiatives	Sub Activities	Implemented by	Timeline	Added Support by
Provision of interim water supply to transitional locations in Kegalle.	Extension of distribution lines Water trucking Installation of onsite treatment/storage facilities	NWS&DB Divisional Secretary Offices	June to September, 2016	UNICEF, Government of Germany, OXFAM
Provision of interim sanitation facilities to transitional locations in Kegalle.	Installation of temporary/ semi-permanent toilet and bathing areas	Divisional Secretary Offices, Local health authorities (MoH)	June to October, 2016	UNICEF, World Vision, OXFAM
Replacement of damaged septic tanks of vulnerable households.	Beneficiary and needs assessments Coordination	Ministry of Health, NWS&DB	August to November, 2016	UNICEF
Provision of permanent water supply to finalised relocations in Kegalle.	Intake rehabilitation Extension of distribution lines Installation of onsite treatment/storage facilities	NWS&DB	June to December, 2016	UNICEF
Structural rehabilitation of damaged dug wells.	Needs assessment.	N/A	October, 2016 onwards	
Improving household water treatment capacity (supply of filters).	Needs assessment Coordination	Ministry of Health, NWS&DB	August to October, 2016	UNICEF
Improving field water testing capacity of NWS&DB (testing and mobility).	Specification analysis.	NWS&DB	July to October, 2016	UNICEF
Rehabilitation of damaged community managed water schemes.	Damage and needs assessment. Budgeting and resource leveraging	Dept. of National Community Water Supply, NWS&DB	October, 2016 onwards	
Water/sanitation stakeholder orientation on disaster risk management.	Compiling orientation package and resources.	Ministry of City Planning and Water Supply, NWS&DB	November 2016 onwards	UNICEF

Table 63. Water and Sanitation implementation strategy for recovery and reconstruction.

The Ministry of City Planning and Water Supply together with NWS&DB; being the sector lead agencies, will incorporate the proposed initiatives and strategies under its national coordination mechanism and liaise with converging line Ministries, including the Ministry of Policy and Planning and Ministry of Disaster Management. The line Ministry, as the sector lead, will also make sure that the initiatives comply with national policies and international ratification of disaster and humanitarian responses. The Ministry will collaborate with the international donor community and UN agencies in the recovery/reconstruction process. They would further link the recovery and reconstruction work with long term development and DRR initiatives pertaining to the sector.

The sector would focus specifically on the coordination and institutionalisation between policy and implementation levels during the recovery phase, particularly involving grassroot level such as local authorities. The sector assessments would be further extended to identify the gaps during these processes in terms of both financial and human resources.

A key highlight during the immediate response was the role and response of communities, civil society organisations, media institutions etc. The sector would assess incorporation of such stakeholders in medium to long-term recovery processes as well by setting mechanisms and platforms. The existing Community Based Organisations that manage water schemes would play a key role in this aspect through capacity building and integration of risk management approaches such as water safety plans. As a whole the sector would have to assess its potential in reaching out both upstream and downstream audiences through customised communication strategies on risk informed and disaster resilient water and sanitation services. Mass media and education system would be more involved in setting sustainable targets in this regard.

Since water and sanitation services are shared by many stakeholders the sector has the challenge of setting standards and mechanisms for overall monitoring of the recovery. While the short term monitoring has been successful there would be challenges in medium and long term monitoring since the sector services are delivered by both mandated and non-mandated service providers including the individual households. The sector coordination mechanism would look into these dynamics in monitoring.

The sector would consider innovation, research and development as a key cross cutting aspect across water and sanitation services to make them more disaster resilient. This would range from simple cost effective solutions to comprehensive academic research. Initiatives in this regard have been already taken on water safety plans by involving university research. Also the traditional indigenous knowledge on withstanding disaster would be revisited.

Sector Assessment Methodology

The post disaster data and needs in relation to pipe borne and transported water supply was captured by the district offices of the National Water Supply and Drainage Board (NWS&DB). Their purview in this regard was mainly urban and semi-urban areas in Colombo and Gampaha districts as well as temporary, transitional and permanent shelter locations in Kegalle and other districts were under the supervision of the respective DGMs and AGMs, the Operations and Maintenance Managers, Operation and Maintenance Engineers, Chemists and Sociologists attached to the NWS&DB were in the forefront of the assessments. The DB directly reported data and needs to the respective District Secretaries, as well as to the Ministry of City Planning and Water Supply through their Head Office.

The damages to water sources as well as sanitation facilities of rural areas were mainly assessed by the Public Health Inspectors (PHIs) under the respective Medical Officers of Health (MoH). This mainly covered the dug wells and standalone domestic latrines. These data was then directed to Disaster Management Unit under Ministry of Health through the respective Regional Directors of Health Services (RDHS). Damages to sanitation facilities in urban areas were assessed by both MoHs and respective local authorities (Municipal/ Urban Councils and Pradeshiya Sabhas). Service engineers and Technical Officers under the local authorities took part in the process.

The Ministry of City Planning and Water Supply and the Ministry of Health convened national coordination meetings on water and sanitation separately as well as jointly. These forums were used to share the sector assessments and needs faster between both the government and non-government stakeholders, as well as the UN and donor agencies. UNICEF supported the Ministry of City Planning and Water Supply, Ministry of Health and the NWSDB in compiling, analysing and interpreting their data thus making them compatible with planning and utilisation of resources from both national and international sources.

Transport

Executive Summary

The transport sector assessment of the PDNA 2016 was a joint effort by a number of government agencies, supported by the World Bank. The objective of the assessment was to estimate the damages and losses caused by the May 2016 disaster on the transport sector, including road infrastructure, road transport and rail transport. Due to the limited time availability, the assessment was based on the data collected by the field offices of the respective national and provincial agencies. The detailed analysis of losses due to detour, loss of revenue to private sector due to cancellation of busses etc., was not possible.

During the floods, regular land transport operations were significantly affected till water levels receded, disrupting road and rail transport operations and causing damage to their infrastructure. The disaster damages and losses varied geographically, depending on the degree of flooding and the occurrence of landslides.

The damages to the roads were mainly recorded as surface damages, damages to culverts, and erosion of river embankments and shoulders, which can be considered as minor types of damage. A total length of 1,039.92 km of national roads was damaged by the May disaster. In addition, 7 bridges and 67 culverts suffered damages. The total estimated cost of the damages is estimated at LKR 2,418 million.

The total length of provincial roads damaged was reported at 497 km and the estimated repair cost was estimated at LKR 1,921 million.

There was only one significant damage reported to the railway infrastructure due to the disaster and the estimated cost of repair was LKR 4.5 million. Additionally, incidents of fallen trees, soil and stones were reported in certain sections of the railway lines, but none of these damaged the railway infrastructure. However, these did cause disruption of railway operations and led to a revenue loss to the Department. During the time of this assessment, these losses had not been calculated. Some sections of railway tracks situated in flat terrain, especially in western province, went under water and thereby interrupted railway operation also, resulting in failures in the signal system.

Since at least some portion of road network in each province was either damaged or went under water, public bus services were interrupted island-wide to a certain degree. However, there are no reported major incidents of damages to buses or related physical infrastructure. Both government operators and individual private operators are supposed to sustain their own revenue losses during this interrupted period either due to (i) de-routing of services or (ii) ceasing of operations for some time. Due to the limited time availability for the assessment, the revenue loss for the private operators were not assessed given it is a complicated process due to the unavailability of data. The revenue losses to the Sri Lanka Transport Board (SLTB) was assessed as LKR 42.5 million.

The total assessed damages and losses to the transport sector is LKR 4.3869 billion.

The recovery strategy for the road sector aims to restore the accessibility, connectivity and mobility, as it was, by repairing damages with preventive measure to avoid similar damages in future. As there was no major destruction of road infrastructure, except for a few locations, the rehabilitation activities will be limited to rectification of surface damages, chip sealing and patching, repairs on embankments, clearing of road surfaces, and the recovery efforts will be short term in nature. In addition, repairs of electrical distribution boards and colour light panel boards of expressways are also included. The long-term development

objectives of the sector was not affected or impacted to a significant extent, since the damages were not severe and widespread. The recovery of rail transport adopted a similar strategy as for road network for the restoration of accessibility, connectivity and mobility.

There was a significant loss in revenue for both the SLTB and individual private bus operators due to interruption of road transport. Similar to the railways, there is no clearly defined strategy in place for recovering revenue losses from such circumstances. Private operators have to bear their losses by themselves, as the government is not bound to compensate their losses. However, again, the government operator, SLTB, may be compensated indirectly through the annual operational subsidy received from the government.

The total estimated recovery needs for transport sector is about LKR 4.187 billion and almost the entire amount will be for repair of damaged road infrastructure managed by national and provincial authorities.

Pre-disaster Context and Baseline

The transport system of Sri Lanka includes all modes of transport, including land, water, and air. Land transport is dominated by road based transport modes, including privately owned vehicles, public buses, para-transit vehicles and freight vehicles. Railway is the other mode of land transport mode which is used for both passenger and freight transportations. Domestic air transportation has not been a popular mode of transport given that almost all parts of the country is accessible by road transport modes within a maximum of 10 hours. Similarly, water transport is hardly used for either passenger or freight transportation. Table 64 shows most recent estimates available for modal shares for all types of modes used for passenger and goods transportation.

	Vehicle-km (million)	Percent	Passenger-km (million)	Percent	Ton-km (million)	Percent
Buses	1,379	5	55,177	55		0
Railways	9	0	5,365	5	134.8	2
Private Vehicles	16,605	60	25,759	26		0
Para-Transit	4,841	18	11,348	11		0
Goods/Land Vehicles[72]	4,819	17	2,585	3	6,436	97
Water Transport	3	0		0	32	1
Total	**27,657**	**100**	**100,236**	**100**	**6,603**	**100**

Table 64. Sri Lanka: Transport Activity and Modal Split (2012).
Source: World Bank. 2012. Sri Lanka Transport Sector Policy Note. Colombo.

Table 64 estimates the transport demand of around 100 billion passenger-km and 6.6 billion freight ton-km carried by an estimated 27.7 billion vehicle km in 2012. Road transport accounts for 95 percent of passenger-km and 98 percent of freight ton-km. In 2012, buses supplied 55 percent of passenger-km; private vehicles, 26 percent; para-transit, 10 percent; and goods vehicles carrying passengers, about 3 percent. Railways account for the remaining 5 percent share of the modal split, although its share increases up to 10 percent in Colombo Municipal Council boundaries. Average annual growth rate in total passenger transport, from 2005 to 2012 is calculated as 6 percent whereas per-capita income grew at 5 percent for the same period.

72 *Passengers in goods transport vehicles constitute a significant proportion in rural areas.*

Land Transport Operations

Road network in Sri Lanka is classified as national, provincial, urban and rural depending on their functionality and ownership. Of the total road network, about 12,210 km are national highways, categorised as class A (trunk roads) and class B (main roads) and about 170 km are expressways. They are administered by the RDA, together with 4,660 bridges and other structures. The 15,500 km of provincial roads is managed by the respective provincial councils and designated as class C and D. There is about 84,000 km of local authority (Local Government/Pradeshiya Sabha) roads in both the urban and rural sectors.[73] A part of remaining roads, estimated at around 4,000 km, is owned or controlled by non-road agencies, such as estate, irrigation and wildlife authorities or other government agencies. The balance is not maintained by any agency. Island-wide road density is about 1.8 km per km^2 and is the highest in the South Asia.[74]

By the end of 2015, the total number of vehicles using the road network is estimated to be approximately 3.76 million. Of these, only around one-third are four-wheel or six-wheel vehicles. Buses used for public transport make up around 27,000 units, representing about 1 percent of the fleet, while all forms of goods vehicles, including land vehicles, make up around 300,000 units, which is only about 8 percent of the operational fleet. Private cars and dual-purpose vehicles are estimated at 700,000 units and account for 18 percent of the operational fleet. Estimated vehicle ownership is about 180 vehicles per 1,000 persons.

Public bus service is the principal mode of passenger transport in Sri Lanka as it carries 55 percent of the modal share (see Table 64). These bus services are provided by the state-run SLTB and by privately run buses, which are mostly owned by individual operators. SLTB has a bus fleet of about 7,000 and operates on about 1,500 bus routes island-wide. Privately owned buses are regulated under two categories of inter-provincial services and intra-provincial services. Inter-provincial bus routes (of around 450) are regulated by the Central Government through the National Transport Commission, whereas intra-provincial bus routes (of around 3,000) are regulated by their respective provincial councils. The total number of buses issued with permits to private operators has increased up to 20,421, while operated average bus fleet increased to 18,534 at the end of 2014. Of these 3,221 provide inter-provincial services whereas the balance of 17,200 is intra-provincial services.

The railway network, which carries about 5 percent of the passenger share and 2 percent of freight share, extends over a total length of 1,567 km. The operation on this network serves 171 major stations, 169 sub-stations and 40 halts.[75] Sri Lanka Railways, which operates the railway network, has 135 locomotives and power sets in active service, with 685 passenger carriages, 595 freight wagons and 150 oil tankers in operating condition.[76] The railway has lost its market share to road transport over the last several decades and needs to compete effectively to regain a place in both passenger and freight markets.

73 Source: Road Development Authority

74 Ibid

75 Source: Department of Railways, 2015

76 Source: National Transport Commission, 2015 (National Transport Statistics)

Post-disaster Effects

The floods and landslides significantly affected the regular land transport operations in mid-May 2016, until water levels receded; and also caused damage to road infrastructure. The disaster damages and losses varied geographically, depending on the degree of flooding. Damages and losses in the transport sector, covering the road network, railway services and public bus services, were assessed based on the information furnished by the relevant government agencies during the PDNA, and the results presented herein are based on this assessment.

Damages to Road Network

National roads : National roads in all the districts, except Polonnaruwa, were affected by the floods. A few were also affected by landslides. The network in Colombo districts reported the highest damage, whereas Badulla and Hambantota districts reported the least damage. However, post-disaster assessments have revealed that extensive damage has not occurred to national roads and bridges. The damages to the roads were essentially recorded as surface damages, damages to culverts, and erosion of river embankments and shoulders, which can be considered as minor types of damages. A total length of 1,039.92 km of national roads were affected by the May disaster. In addition, 7 bridges and 67 culverts also suffered damages. The total estimated cost of the damages is estimated as LKR 2.42 billion. Table 67 provides damage details by district.

In addition to the above damage to A and B type roads, around LKR 2,000 million cost of damage has been reported to the RDA on other roads, which are maintained by the RDA, Provincial RDA and other local government agencies.

Provincial roads : Nearly 700 km of the Provincial Road network in 9 districts (Colombo, Gampaha, Kalutara, Badulla, Monaragala, Matara, Kurunegala, Puttalam and Kegalle) have been damaged due the floods and landslides. The total length of the provincial roads damaged was 497 km, and the estimated repair cost is LKR 1.921 billion. In terms of the length of roads damaged, Badulla, Monaragala and Kegalle were the worst affected districts. The nature of damages on provincial roads is almost the same as on national roads, but the magnitude of cost per unit length is less. Table 68 gives details of the provincial roads damaged.

Expressway : Some sections of the Expressway network were damaged due to the flood. The affected locations have been specifically identified together with nature of damages and summarised in Table 65.

Location	Nature of Damage
Kaduwela Interchange of Outer-Circular Expressway	Drains around the interchange were blocked with mud. Road surface of Colombo-Hanwella road was covered with 1ft layer of mud. Electrical distribution boards were damaged.
A road section from Athurugiriya to Kothalawala of Outer-circular expressway	Advance Direction Boards were damaged at Kothalawala interchange.
Entry point of Athurugiriya interchange	Electrical Distribution Boards and Colour Light panels were submerged.
At 101+500RHs of Southern Expressway	Failure of soil nailed slope protection at 101+500 RHS.

Table 65. Locations and Nature of Flood Damages to Expressways. Source: RDA.

Damage to Railway Network

There was only one reported incident of damage to the railway infrastructure due to the disaster: a dislocation of railway tracks of main line between Kadugannawa and Rambukkana as a result of an earth cave-in. Besides this, incidents of fallen trees, soil and stones were reported in certain sections of the railway lines but none of them damaged the railway infrastructure. However, these did cause disruption of railway operations and led to a revenue loss to the Department. By the time of this assessment, these losses had not been calculated. Some sections of railway tracks in flat terrain, especially in the Western province, went under water and thereby interrupted railway operation, also causing failures in the signal system. The reported incident, which led to damages and revenue losses in the railway sector, is given in Table 66.

Location	Nature of Damage/Disruption
Main Line, between Kadugannawa and Rambukkana (Kegalle District)	Dislocation of rail track due to earth caving
Kelani Valley Line, between Kottawa and Homagama (Colombo District)	Disruption to the railway operation due to fallen trees
Kelani Valley Line, between Kosgama and Avissavella (Colombo District)	
Main Line, between Kadugannawa and Rambukkana (Kegalle District)	
Main Line, between Kadugannawa and Rambukkana (Kegalle District)	

Table 66. Locations and Nature of Flood Damages to Railways. Source: Department of Railways.

Disruption and Damages to Public Bus Services

Since at least some portion of road network in each province was either damaged or went under water, public bus services island-wide were interrupted to a certain extent. However, there are no reported major incidents of damages to buses or related physical infrastructure. Both government operators and individual private operators are supposed to sustain their own revenue losses during this interrupted period either due to (i) de-routing of services or (ii) ceasing of operations for some time. Due to the limited time available for the assessment, the revenue loss for the private operators was not assessed, given the unavailability of data and the complicated process of data collection. The revenue losses to the SLTB are given in Table 69, as well as the minor damages reported to the SLTB buses.

Summary of Damages and Losses

District	Road Class	Length (km*)	Cost of Damage LKR Mn	Bridge		Culvert		District Cost LKR Mn
				Damage LKR Mn	Nos.	Damage LKR Mn	Nos.	
Gampaha	AA i	52.05	7.5					83.3
	AB i	5	32					
	B i	50.11	23.8					
	B j	0.5	20					
Kalutara	B i	3.24	15.27			1	1	16.27
Colombo	AB i	27.97	48.25					707.79
	AB j	1.17	581					
	B i	62.78	77.66					
	B j	9.5	0.23					
	AA j	2.8	0.65					
Matara	A i	155	44					44.0
Hambantota	A i					0.150	2	0.3
	B i	3	0.15					
Galle	B i	3.03	66			20	13	182.5
	B j	4.09	56.5	40	1			

District	Road Class	Length (km*)	Cost of Damage LKR Mn	Bridge		Culvert		District Cost LKR Mn
				Damage LKR Mn	Nos.	Damage LKR Mn	Nos.	
Mullaitivu	B i	500m	15					15.0
	A i	114.5m	3.0					
Mannar	B i	91.2m	4					7.0
Jaffna	A i	25.74	6					39.0
	AB i	106.03	9					
	B i	89.12	24					
Vavuniya	A i	600m	1.5					10.5
	B i	6	9					
Kilinochchi	A i	100m	0.3			1.5	1	1.8
Anuradhapura	A i	14.25	20.7			20	1	162.51
	B i	15.53	16.01	3	1	73.8	7	
	B j	100m	5	24	2			
Monaragala	B i	25m	0.2			2	1	2.2
Badulla	A i	50m	0.2					0.2
Kegalle	A i	4.5	62.1			6	9	163.13
	B i	6.25	75.53			4.5	8	
	B j			15	1			
Ratnapura	A i	21.7	10.1			4	2	25.43
	B i	40.05	3.33			8	1	
Kandy	A i	30.4	84.8					337.7
	B i	63.74	216.9			36	7	
Matale	B i		12.3			1.5	2	25.0
	B j		11.2					
Nuwara Eliya	A i	5.5	10					110.92
	B i	256	100.92					
Puttalam	A i	12.06	12					36.0
	B i	10.1	14					
	B j	4	10					
Kurunegala	A i	1.0	1					82.0
	B i	71.585	31					
	A j			25	1			
	B j			25	1			
Batticaloa	A i	19	52.1					54.63
	B i	0.75	1.5			1.03	1	
Trincomalee	A i	2	5			16	2	57.0
	B i	18	35			1	2	
Ampara	AA i	23.085	18			1	2	53.8
	B i	31.615	32.8			2	5	
Express way damages								**200.0**
Total		**1,039.92**	**1,886.5**	**132**	**7**	**199.48**	**67**	**2,418.0**

*Note: i - minor damages; j - major damages, *in km unless noted as metres*

Table 67. Damages to National Roads. Source: RDA.

District	Road Type	Road Length Damaged (km)	Estimated Repair Cost (LKR million)
Kegalle	C	134.0	297.5
	D	60.4	193.0
Kurunegala	C	17.6	146.0
	D	6.3	50.5
Puttalam	C	17.1	143.0
	D	5.8	42.5
Gampaha	C	13.1	204.4
	D	8.6	94.7
Colombo	C	4.1	45.8
	D	3.4	38.2
Kalurata	C	2.8	31.0
	D	3.0	51.5
Badulla	C	83.7	176.9
	D	14.0	52.1
Monaragala	C	44.0	53.2
	D	75.0	144.6
Matara	C	4.2	156.0
TOTAL		**497.1**	**1,920.9**

Table 68. Damages to Provincial Roads. Source: PRDAs.

District	Revenue Losses (LKR million)
Colombo	15.4
Gampaha	8.0
Kegalle	7.4
Ratnapura	3.6
Puttalam	8.1
TOTAL	**42.5**

Table 69. Revenue losses to SLTB. Source: SLTB

District	Damages (LKR million)	Losses (LKR million)	TOTAL (LKR million)
Colombo		1	1
Kegalle	4.5		4.5
TOTAL	**4.5**	**1**	**5.5**

Table 70. Damages and Losses to Sri Lanka Railway. Source: Department of Railways.

All Districts	Damages (LKR million)	Losses (LKR million)	Total (LKR million)
GRAND TOTAL	4,343.40	43.50	4,386.9

Table 71. Transport damages and losses.

Impact Analysis on Development Goals

With respect to the National Road Master Plan of the RDA, the strategic goal is to be the excellent service provider with an efficient and safe road network, based on new technology. Although the recent flood has affected the national road sector the damages were considered to be moderate with respect to other sectors of the national economy. The damages that occurred within this sector have not affected the national development sector goals of the country to a great extent, even though the high mobility network of the country has been disturbed.

Cross-cutting Issues

The National Road network of Sri Lanka is considered to be a crucial economic infrastructure within transport sector, providing high mobility, connectivity and accessibility. Thus an early recovery of the sector is vital for build back as it is.

It is fortunate that the roads under the national road network were not affected to a greater extent, which would have in turn affected agriculture and other productive sectors, or even social sectors, such as health and education.

For the achievement of disaster risk reduction the RDA has already initiated a project called "Landslide Disaster Protection Project on National Roads" to be undertaken within all identified national roads which proved to be prone to landslides. Its goal is to establish and maintain a safe and comfortable road network by improving the capacity for landslide mitigation of national roads, through modelling landslide counter measures and an early warning system and providing assistance to construct such infrastructure at selected locations. The purpose of this project is to mitigate landslide disaster targeting for A-class national roads as basic infrastructure through implementing appropriate counter measures in highland areas thereby enhancing the security of the road network and thus safeguarding the lives of people. It also aims to introduce Japanese Technology for landslide countermeasures, not only for construction but investigation and design. Its implementation period is May 2014 to March 2019.

Recovery and Reconstruction Strategy

National Road Network : As there is no reported major incidence of damage, except in a few locations, financial needs for recovery are basically for the short term. Accordingly, the smooth functioning of road traffic will be guaranteed, with a quick recovery of damages. The recovery strategy for the road sector aims to restore the accessibility, connectivity and mobility to what it was, by repairing damages with preventive measures added so as to avoid similar damage in future. As minor damages were recorded in the overall network, rehabilitation activities were limited to rectification of surface damages, chip sealing and patching, repairs on embankments and clearing of road surfaces. In addition, repairs of electrical distribution boards and colour light panel boards of expressways are also included. Essentially, the long-term development objectives of the sector were not affected or impacted to a larger extent, since the damages were not severe and widespread.[77]

77 The typical annual budget of the Road Development Authority for island-wide maintenance is about LKR 4000 million

Provincial Road Network : It was not possible to assess the significance of the damage to the C and D class roads by the disaster in the time period of the PDNA. The PRDA falls within a devolved level of government (falling under nine separate provincial councils), and without information on the annual budgets and allocations for the different PRDAs this assessment could not take place. In fact the total Provincial Council budget also changes on a yearly basis, and the PRDA is only a subset of this figure. The district wise damages and losses to the C and D roads were however quantified, and recovery estimates have been made.

Railway Network : Similar to the strategy adopted for road network, restoration of the accessibility, connectivity and mobility was the damage recovery strategy for the railways too. However, unlike for roads, it doesn't aim to incorporate extensive preventive measures due to geographical limitations for structural constructions especially in hilly terrain where the damages were incurred. The Railway Department uses their in-house labour force, machineries, and equipment for repairing damages and hence minimal financial assistance would be required from external sources, especially when dealing with minor damages. There is however no clearly defined strategy in place for recovering revenue losses due to disruption of operations in this nature. However, annual operating subsidy provided by the government may indirectly compensate these losses. The financial needs for rehabilitation of rail track between Rambukkana and Kadugannawa (Kegalle District) is estimated at LKR 4.5 million whereas revenue loss due to the disruption of operations is estimated at LKR 1.0 million island-wide.

Public Bus Services : There is a potentially notable loss in revenue for both SLTB and individual private operators due to interruption of operations. However, similar to the railways, there is no clearly defined strategy in place for recovering revenue losses due to such circumstances. Private operators have to bear their losses by themselves, as the government is not bound to compensate their losses. The government operator, SLTB, may however be compensated indirectly through their annual operational subsidy receiving from the government.

Recovery and Reconstruction Needs with Costs

District	Recovery Needs (LKR million)			TOTAL
	National Roads	Provincial Roads	Railway	
Gampaha	83.3	299.1		382.4
Kalutara	16.3	82.5		98.8
Colombo	707.8	84.0		791.8
Matara	44.0			44
Hambantota	0.3			0.3
Galle	182.5			182.5
Mullaitivu	15			15
Mannar	7			7
Jaffna	39.0			39
Vavuniya	10.5			10.5
Kilinochchi	1.8			1.8
Anuradhapura	162.51			162.51
Monaragala	2.2	197.7		199.9
Badulla	0.2	229.0		229.2
Kegalle	163.13	490.5	4.5	658.13
Ratnapura	25.4			25.4
Kandy	337.7			337.7
Matale	25.0			25
Nuwara Eliya	110.9			110.9
Puttalam	36.0	185.5		221.5
Kurunegala	82.0	196.5		278.5
Batticaloa	54.6			54.6
Trincomalee	57.0			57
Ampara	53.8			53.8
Expressways	200.0			200
TOTAL	**2,417.94**	**1,764.8**	**4.5**	**4,187.24**

Table 72. Transport recovery and reconstruction needs (all short term until end of 2016).

Implementation Strategy for Recovery

The ultimate goal of recovery strategy of national road network is to restore at a minimum the pre-disaster conditions within the high mobility network in disaster-affected areas of the country. To accomplish the prescribed goal, the structures damaged or at the verge of damage have to be reconstructed or rehabilitated based on build-back better principles.

To this end, the RDA is responsible for the national network, consisting of A and B class roads, including associated bridges and culverts, as well as the Expressways. The PRDA is responsible, through the Provincial Councils, for the maintenance of C and D class roads, with their associated bridges and culverts. E and F class roads fall within the care of local government level (Pradeshiya Sabha). A part of remaining roads, estimated at around 4,000 km, is owned or controlled by non-road agencies such as irrigation and wildlife authorities (e.g. in national parks) or other government agencies, that are thus responsible for the repair and upkeep of those roads.

Sector Assessment Methodology

The transport sector damage and loss assessment was primarily based on the information collected and reported by the RDA, Provincial Road Development Departments (PRDDs) of the affected provinces, Sri Lanka Railways (SLR) and SLTB. In the aftermath of a disaster, RDA gathers damage data through the executive engineer's offices and the PRDDs through their divisional offices. The damages on the railway tracks, bridges, buildings etc. are assessed by the "Way and Works" sub department of the SLR. The district engineers assess such damages and report to the sub department in Colombo. The damages to engines, carriages etc. are handled by the "Motive Power" sub department of SLR in Colombo. The losses due to disasters, mainly the losses of revenue due to cancellation of trains, are assessed by the "Operations" sub department. By the time of the PDNA these losses had not been assessed. The SLTB collects damage and loss data through its regional offices and the Ministry of Transport and Civil Aviation collected this information from SLTB and furnished to the assessment team.

Power Supply

Executive Summary

The objectives of the Post Disaster Need Assessment in the Power Supply Sector to identify the damage and loss caused to the power sector by the disaster, and thereby assess the larger impact to the economy of the country and gain a better understanding of the recovery needs of the power sector to ensure a resilient rebuilding process.

Damage was caused to the electricity distribution network of the country. The total damage of the electricity sector was estimated at LKR 207 million, the total loss was LKR 454 million. The total needs of the electricity sector were identified as LKR 365 million.

The damage and loss data were provided by the four distribution divisional offices of the Ceylon Electricity Board (CEB) and area office of Lanka Electricity Company (LECO).

Out of 18 districts that were identified as affected in this sector, the highest number of damages was recorded in the Colombo and Gampaha Districts. Two utility providers under the guidance of the Ministry of Power and Renewable energy were able to restore the power supply within 48 hours in most of the districts apart from the areas severely damaged by the floods.

This sector assessment has identified the measures that need to be taken in reducing the future disaster risk and the measures to be taken to restore the power supply with immediate effects.

Pre-disaster Context and Baseline

Sri Lanka reached the national electrification rate of 98.7 percent by mid-2016 and achieved 100 percent electricity accessibility in 2016, with per capita electricity consumption at 562 kWh/person. The recorded maximum electricity demand during the first six months of the country was 2,358 MW on March 10, 2016.

Power Sector governance and administration comes under the Ministry of Power and Renewable Energy. CEB is the main utility provider of the country under the purview of the Ministry, which is responsible for most of the generation and distribution activities, while being completely responsible for transmission. LECO, a subsidiary of CEB, is the other distribution licensee responsible for distributing electricity along the coastal belt of the Western Province and part of Southern Province.

CEB contributed 80 percent of the electricity generated in 2015, while the private power producers' share was 20 percent of the total electricity generation. The total installed capacity of the generation systemic was 3,950 MW as at June 30, 2016.

Type of Station	Capacity (MW)
Major Hydro-power stations	1,376.95
Thermal Power stations	1,504.00
Private Thermal Power Producers	611.00
Non-Conventional Renewable Energy	458.50
Total	**3,950.45**

Table 73. Total electricity capacity.
Sources: Ministry of Power and Renewable Energy and CEB.

In the year 2015, Annual Energy Generation was 13,090 GWh. 38 percent out of the total electricity generation is from the major hydro power plants, while 51 percent was from Thermal including coal generation and 11

percent from non-conventional renewable energy (Minihydro, Wind, Solar and Biomass energy). About 33 percent of electricity energy was utilised by households and 31 percent was consumed by the industrial sector. About 2 percent by hotels, 21 percent by general-purpose establishments and balance 13 percent was consumed under bulk supply and street lighting.

There are 210 power stations in the country contributing to the total energy generation including private power producers (PPPs). There are 26 major power plants owned by CEB including 17 of hydropower stations, 16 thermal power stations, with 1 coal power plant and a wind power plant. The remaining 184 power stations are owned by PPP, which include 6 thermal power stations, 154 mini-hydro power stations, 15 wind and 11 solar and biomass power stations.

The transmission system of the country, comprising of 601 km of 220 kV lines and 2,310 km of 132 kV transmission lines, deliver power to 63 grid substations. The distribution system comprises of 29,694 km of 33 kV lines, 2,281 km of 11 kV lines and 133,565 km of low tension (LT) lines; and delivers electricity to the doorsteps of 6.2 million electricity consumers in the country.

Post-disaster Effects

The electricity distribution system suffered physical damage during the floods and landslides, disrupting power supply in 19 districts, in 8 Provinces, between May 16 and 31. The highest number of electricity damages was recorded from Kaduwela Divisional Secretariat Division in Colombo District. Damages to the distribution system in Gampaha district was the highest when compared with other affected districts.

Electricity supply was normalised by day 3 to 10 in Kaduwela, Seethawaka and other mostly affected Divisional Secretaries Divisions especially in Colombo and Gampaha, depending on the severity and accessibility. CEB and LECO were able to restore the power supply to other districts in the country within 48 hours.

As part of emergency operations of the CEB, electricity isolations were carried out, by considering the impending crises to avoid the casualty and damages due to electrocutions. Field data was closely monitored and act upon accordingly. Tri-service armed forces, police and government institutions also helped in numerous ways upon requests. Weather reports were used to understand the ground situation.

The disaster situation was monitored daily and a special contact number was announced for the public to report any electricity grievances. Special teams to respond to such needs were deployed and responded to in a minimal time span. Financial limits were relaxed to manage the situation effectively. Supply was restored soon after ensuring the safety to the places even though the energy meters were damaged (most of the meters were replaced at the same time). Additional employees (field staff) were deployed to speed up the process. Some actions were coordinated with Assistant Government Agents' requests. Precautions were taken to minimise the electrical property damage, which may pop up after energising the system.

Due to the effects of the floods, it was not possible to re-use some of the sensitive equipment and metallic parts, and as such had to be replaced to normalise the system.

The physical damage to the electricity distribution system was estimated at LKR 207.66 million. Mainly, Bulk Supply Energy meters, Current Transformers, MCCB's (Module Case Circuit Breakers), distribution lines, electricity poles (Both Low Tension and Medium Voltage), MCCB Cut Outs and Normal Energy meters were damaged. A few stores owned by CEB and some gantries were also affected.

The total damage and losses incurred by the Power supply sector was LKR 661.86 million. Physical damages to electricity infrastructure were estimated at LKR 207.66 million. Out of which LKR 154.67 million worth of damages were due to damage to CEB owned infrastructure and LKR 52.99 million in damage to the LECO. Losses (the revenue losses) of the electricity sector were estimated at LKR 454.20 million. Losses were higher in CEB when compared to the losses in LECO areas which amounting to LKR 344.49 million, whereas LECO losses were estimated at LKR 109.71 million.

Institutional Capacity of Electricity Sector

The CEB is the national Government institution of the country, which has the capacity to handle this kind of disaster situation; effectively. Emergency relief/response measures were realisable as the financial capacity, capability, human capacity and easy deployment where logistics are not a hindrance.

Summary of Damages and Losses

	Damages (LKR million)	Losses (LKR million)	Total (LKR million)
Ceylon Electricity Board (CEB)	154.67	344.49	499.16
Lanka Electricity Company (LECO)	52.99	109.71	162.70
Total	**207.66**	**454.20**	**661.86**

Table 74. Power Supply damages and losses.

Impact Analysis on Development Goals

Electricity is the prime energy supply means to all social interfaces such as hospitals, forces, water supply, government and private institutions, religious institutions, fuel pumping stations and business places etc. The disruption of the supply was 3 to 10 days in most affected areas in Gampaha and Colombo, and 2 days in other districts depending on the severity of the damage and accessibility. In some cases the recovery caused a considerable time to restore normalcy even after the water level subsided, especially in places that were fully submerged.

Though the bulk supply of power given to factories was also restored soon after the flood, workers took a few more days to return to their occupations, as their living conditions were still not normalised. Therefore, the loss of revenue in this period must also be taken into consideration.

Cross-cutting Issues

The administration of post disaster situation was not seriously hampered as all logistics were handled and supervised by senior officers and monitored by the authorities. The help given by voluntary representatives, peer groups, etc. and the management, made the task to be realised effectively. The working group in the sector worked in teams to help the affected people.

People living in the low-lying areas were affected mostly. Those who have a small income could not start a normal life because of all the other issues. The CEB carried social work initiatives by giving clearance to officers to inspect the internal wiring within affected houses and to carry out repairs free of charge.

Environment : CEB took the initiative to clear the debris of the electrical network to avoid potential electrocutions and educated the residents about possible impacts.

Recovery and Reconstruction Strategy

In the immediate aftermath of the May 2016 disasters, the CEB deployed its fullest capacity to restore the power supply in affected areas, and as such, in most areas power supply was restored within 48 hours. As such, the damages caused to the power lines and other installations are fully restored at this point and thus a specific recovery and reconstruction strategy for this disaster will not be required.

However, the Ministry of Power and Energy has assisted CEB to secure loans from funding agencies such as JICA and ADB since 2010 to upgrade the transmission and distribution network. The CEB has thus been able to improve the transmission and distribution network gradually according to the growing demand. This enables CEB to implement a robust network resilient to most natural disasters.

The CEB experienced an island-wide blackout on two or three previous occasions in 2015 and 2016. As a result, a Cabinet appointed committee has studied the vulnerability of the power supply system and has made a number of recommendations to the CEB. The Ministry of Power and Renewable Energy has initiated preparations of Disaster Management guidelines and Plan for Power Sector under the provisions in the Disaster Management Act, May 2005. Considering the May 2016 disasters, the Ministry directed the CEB to implement the recommendations provided by the Committee, which includes putting in place a disaster preparedness plan, building capacity of the staff and setting up a disaster management committee. It is expected that the above arrangements will strengthen the CEB's capacity to respond to future disasters.

Under the guidance of Ministry of Power & Renewable Energy, the CEB and LECO have recently initiated the implementation of a smart distribution network with underground cabling and a sophisticated monitoring system for reliable distribution system.

Pre disaster planning

The System Control Centre of CEB studies the weather patterns and weather forecast and also considers the announcement of water level for the preparedness plan. CEB area offices and breakdown gangs are informed accordingly to act on a disaster situation.

The implementation of Disaster Management Plan for the Power Sector was initiated by the Ministry of Power and Renewable Energy with collaboration of Ministry of Disaster Management and Disaster Management Centre.

Recovery and Reconstruction Needs with Costs

Recovery needs (LKR million)	Short Term (2016)	Medium (2017)	Long term (2018-2020)
Identified backup materials of mostly needed items for restoration of electrical supply, such as Energy Meters, Poles, MCCBs etc.		(Cost as the Disaster Damage + 10%)/229	
Maintain stores at convenient vicinity for quick transportation		10	
Portable Generators with fuel storage for on-going needs/ social needs		4	
Solar Powered Lamps/Lanterns for life supports		2	
Solar Powered Chargers for operational/social needs		7	
PTT (Push To Talk) enabled hand held radios for operational activities		2 (for 20 Nos.)	
Motorised Boats with lifesaving Jackets for material and workers transport		10 (for 2 Nos. of Boats)	
Appointing a Disaster Management Team for Power Sector			
Capacity Building of Power Sector employees on Disaster Risk Reduction Disaster Management Strategies			5
Implementation of Disaster Management Plan for Power Sector			
Establish Disaster preparedness and Disaster Management and desk/Office at Provincial Control Center/Call Center of Ceylon Electricity Board			1 (For equipment)
Implementation of Early Warning Systems together with Public addressing			10
Setup of LED systems for Street Light illumination for the affected areas			30
Deployment of Unmanned Ariel Vehicles to collect real information equipped with Transceivers			10
Overhead and Contingency		25.4	5.2
Total		**307.34 279.4 Mill + Cost of Recovery (with 10%) as of now**	**57.2**
Grand Total			**364.54**

Table 75. Power Supply recovery and reconstruction needs.

Implementation Strategy for Recovery

Two utility providers CEB and LECO are responsible for the implementation of recovery and reconstruction strategy with respect to the distribution network damages.

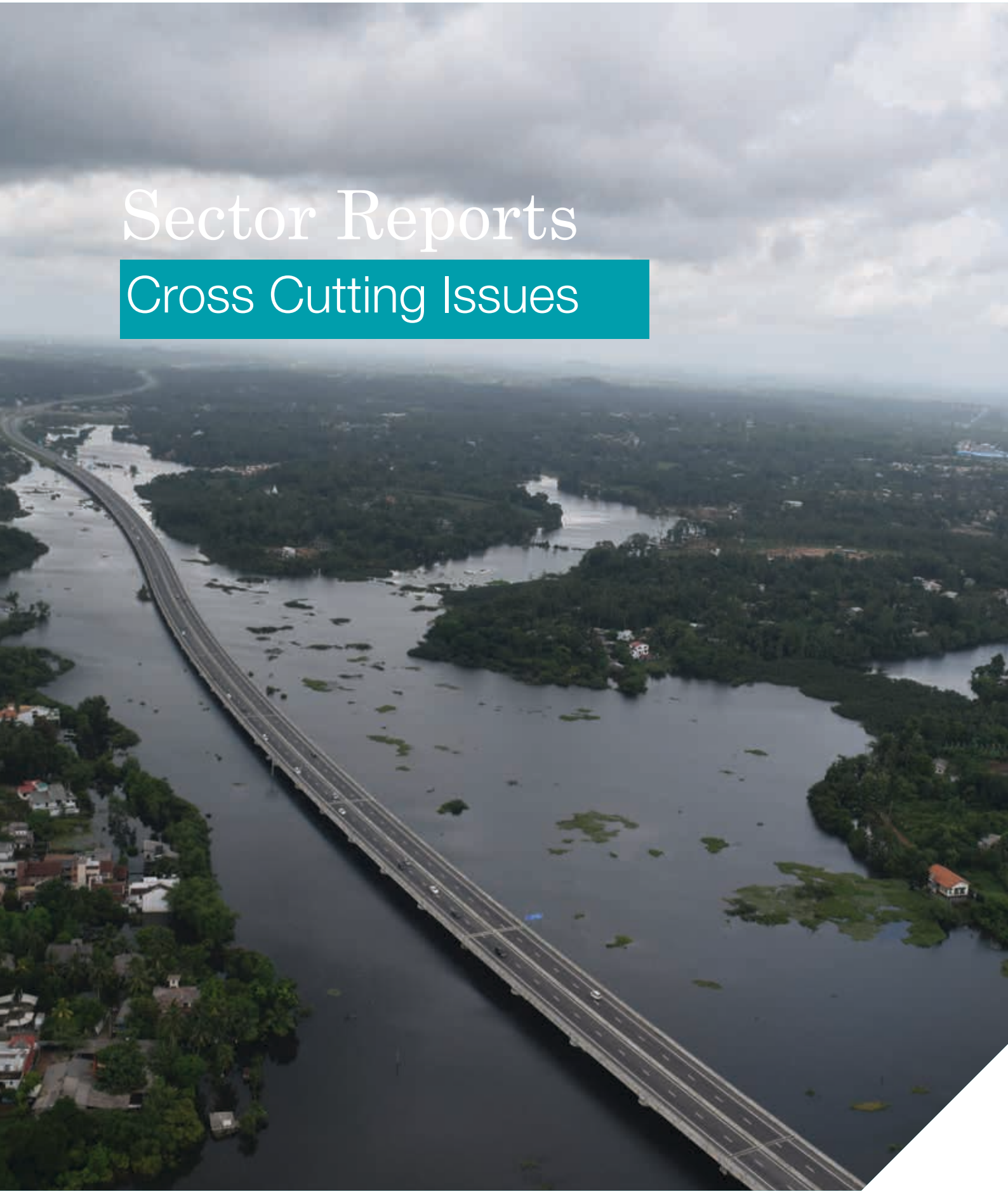
The Ministry of Power and Renewable Energy is facilitating these two utility providers through the formulation of Energy Policies to implement an effective recovery mechanism and the coordination of donors to secure finance for future development and upgrading of the present distribution network.

Consultants of JICA together with CEB experts will later in 2016 carry out an Electricity Sector Master Plan Study, which includes the development of a Distribution Master Plan. This study will identify environmental concerns and the Distribution Master Plan will enable CEB to strengthen the distribution network and to ensure a coordinated approach for generation and transmission.

Sector Assessment Methodology

Data and information on the electricity Distribution Network was assessed by Area Engineering Office of CEB and the data were collected by the Divisional Secretariat Division and forwarded to the CEB Distribution Divisional Office. Needs to restore the supply was raised by the area office of CEB and administrated by the four Distribution Divisional offices of CEB covering the whole island. Loss and damage data of LECO distribution areas were also collected by the LECO area office and compiled at the LECO head office.

Revenue loss was calculated on a pro-rate basis, the average monthly bill for a calendar month for a number of days (basically 10 days) of loss of power was considered. An average loss of LKR 500 per household was taken into consideration. Standard costs for utility works are published yearly for costing purposes, and these figures are used for the states replacement costs. Prices, which are not in the price list, are taken at market prices, with a 10 percent tolerance.



Sector Reports

Cross Cutting Issues

Environment

Executive Summary

The intense rainfall caused a widespread disaster situation in May 2016 in Sri Lanka, leading to significant damage to its natural resource base. Non-enforcement and non-compliance of existing environmental laws by development sectors and general public created added risks, making the disaster and its impacts more severe, while leaving behind additional risks (e.g. new landslide risk zones have been created as a result of the landslide in Aranayake). Deriving data on damages and losses to environment was challenging due to serious gaps in data and information in many important areas. Gaps exist in processes and leadership for information generation and analysis to understand extent of destruction.

Damages related to environment could be categorised as damages (a) to ecosystems (b) to infrastructure related to environment management (e.g. wildlife) (c) due to leachate from Municipal Solid Waste (MSW) dumps and (d) due to contamination of pollutants from industries mostly located in the Kelani River basin. Additional costs incurred for the disposal of waste generated during emergency and early recovery, and loss of revenue to the Department of Wildlife Conservation (DWC) were included in losses.

Damages to ecosystems are identified as riverbank erosion (Deduru Oya and Kelani River), destructions to wetlands, soil erosion and accumulation of silt in low and agricultural lands, and loss of forest and agricultural lands. Quantifiable damage to ecosystems in Aranayake is estimated to be LKR 520.8 million. The DWC incurred some infrastructure damage estimated to be LKR 27.4 million. The controversial MSW dumping sites in the Western Province (and the Central) gave rise to serious follow on disasters as these dumps collapsed spreading contamination to larger areas causing serious issues. Quantifying and valuing damages and losses to household goods due to health issues and expenses for extra cleaning requirements, incurred as a result of waste contamination, was not calculated due to lack of data.

The government allocated LKR 18.1million to collect solid waste in urban areas. The Central Environment Authority (CEA) and private sector had to allocate additional expenses to reduce pollution risks from industries located adjoining the Kelani River and its tributaries. The loss of revenue for the DWC from tourism in the three venues accounted for LKR 3.898 million: a 46.5 percent of revenue loss compared to May 2015 seen in these venues.

Total damage and loss to the environment sector was estimated as LKR 27.4 million and LKR 542.84 million respectively, subject to above mentioned limitations of not being able to capture substantial portion of damages and losses.

While environment restoration is a long-term process and difficult to value, a conservative estimation of LKR 230.5 million was arrived at as essential to support recovery strategies. Recovery strategies should prioritise restoration of disaster-induced damages to environment in the short and medium term within a longer-term strategy that enables shifting towards environmentally sensitive development.

Pre-disaster Context and Baseline

The relationship between environment and disaster resilience

Environmental degradation contributes to disaster risk. While patterns of settlements, livelihoods and commercial activities can degrade environment, disasters in turn can worsen the situation. International agreements such as the Hyogo Frameworks for Action, the Sendai Framework for Disaster Risk Reduction,

the Millennium Declaration, and the UN Millennium Ecosystem Assessment clearly identify these links and implications; particularly the consequences on human security and wellbeing, while recognising that climate change increases and intensifies these risks and implications. The May 2016 floods and landslides is yet another disaster that not only revealed these underlying environmental (socio-economic and political) issues, but also contributed to worsen the overall status of environment and disaster risk of the country.

Sri Lanka is highly vulnerable to climate change impacts and extreme weather events, such as high intensity rainfall followed by flash floods and landslides, and extended dry periods resulting in water scarcity, are now becoming common occurrences in the country.[78] The increasing risks and disaster impacts are further aggravated by development that does not take environment into account

A combination of heavy rainfall, the topography and inappropriate land use practices has increased incidences of landslides in the central hills of Sri Lanka over last few years. Road and building construction, clearing forests for cultivation and other development initiatives have disturbed the equilibrium of slopes. Further, landslides degrade landscapes by causing offsite damages such as siltation of agricultural lands and water bodies.[79] Floods too, contribute to land degradation, causing severe soil erosion and depositing sand and silt in low-lying areas, wetland and agricultural lands.[80] Out of 25 administrative districts in Sri Lanka 10 are prone to landslides (including Kegalle and Kandy) and cover approximately 30 percent of the total land area, which is occupied by about 35 percent of the island's population.[81] The National Building Research Organisation (NBRO), over the past few years, has been engaged in interventions, including increased awareness, mapping and modelling, identification of landslide hotspots, early warning systems, and the introduction of building guidelines and approval processes for local authorities.[82] Nevertheless, the enforcement of guidelines prepared by NBRO was however weak due to inadequate awareness at local government levels.

Forests : account to about one third of the country's land (Figure 14) and play an important role in disaster risk reduction. Yet, human interventions have degraded forest ecosystems drastically, as well as their ability to provide services related to resilience building e.g. forested-slopes are less prone to landslide risks.[83] Though Sri Lanka is considered to be a global biodiversity "hotspot", the country's high biodiversity, which also contributes significantly to resilience functions of ecosystems, are declining fast. Protected Areas established to conserve these threatened ecosystems and species presently covers 1,227,007 ha or 19 percent of the land area of the island.[84]

78 *MMDE, 2015: National Adaptation Plan for Climate Change Impact in Sri Lanka: 2016 to 2025.*

79 *MERE, 2014, Sri Lanka's Fifth National Report to the Convention on Biological Diversity. Biodiversity Secretariat, Ministry of Environment and Renewable Energy.*

80 *MMDE, 2015, Ibid.*

81 *Jayaweera S, 2009, Importance of Planning Guidelines in Landslide Disaster Risk Reduction.*

82 *Source: Ministry of Disaster Management.*

83 *UN-REED, 2015, Summary Report on Drivers of Deforestation and Forest Degradation in Sri Lanka.*

84 *MMDE, 2016, Progress Report 2015 and Action Plan 2016. Ministry of Mahaweli Development and Environment.*

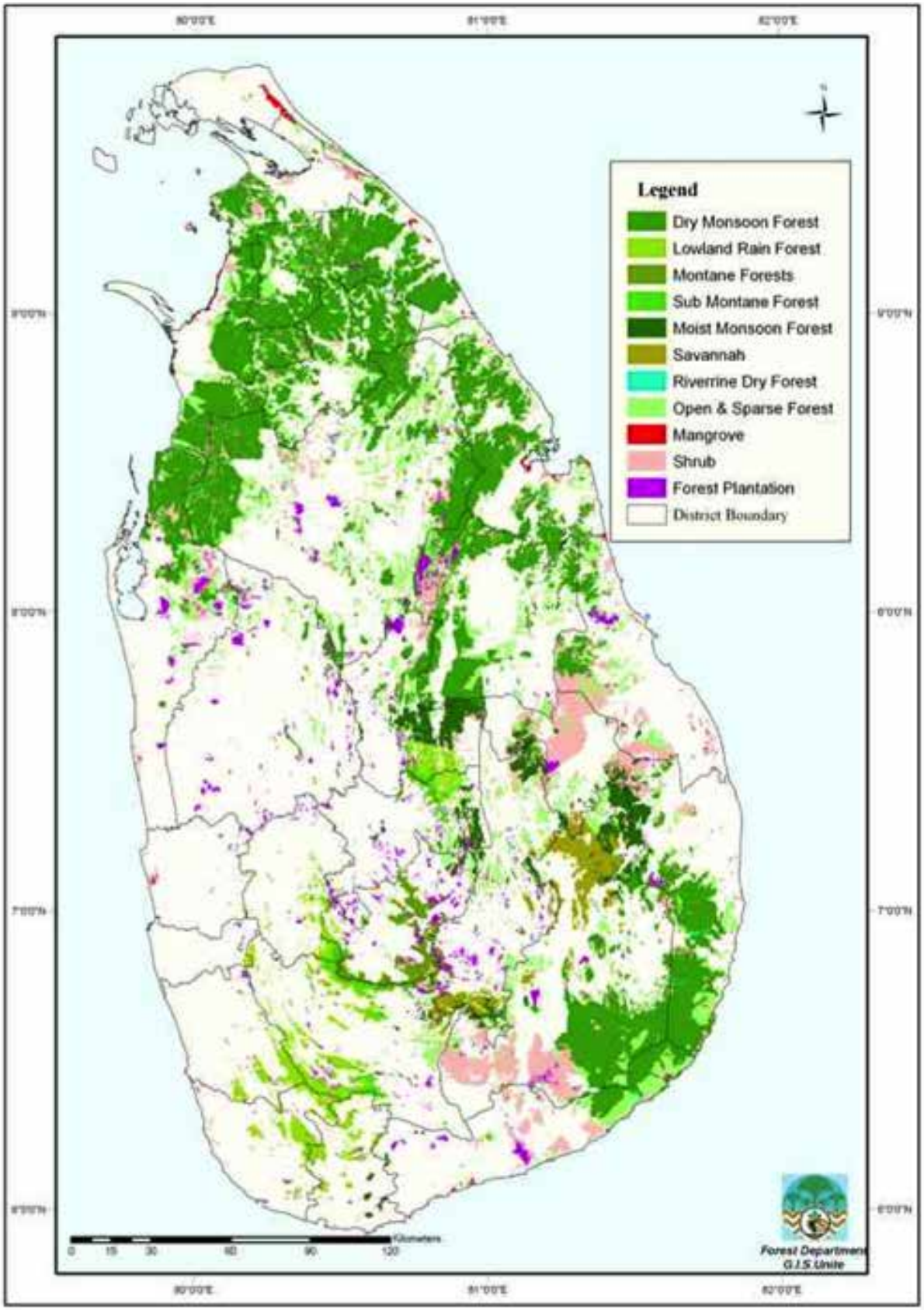


Figure 14. Forest cover of Sri Lanka. Source: Forestry Department.

Wildlife and Nature are also popular tourist attractions and a significant increase of revenue from visitors to forest reserves, wildlife parks, national botanic gardens and the national zoological gardens has been recorded.[85] LKR 827.5 Million was the revenue earned from tourists visiting National Parks in 2014.[86] Considerable elephant population found in the forests of Puttalam and Anuradhapura, is part of this attraction. Recurrent and extended periods of droughts and spread of invasive species restrict food and water for animals have resulted in increased human elephant conflict.[87] [88]

Wetlands play a vital role in flood retention.[89] For example, 90 percent of the economic value calculated for the Muthurajawela wetland (LKR 726.5 million/year, or LKR 0.24 million/ha) consists of estimated values of ecosystem services such as flood attenuation and industrial waste treatment.[90] Yet, a majority of wetlands in Sri Lanka are threatened as wetlands are generally considered as wastelands by the general public and development sectors. Wetlands have been encroached, converted, reclaimed or used as waste dumpsites to support increasing urbanisation and industrialisation. Wetlands are also threatened by invasive species (e.g. Annona glabra) resulting in negative changes in ecosystems including significant reduction in water-holding capacity of the wetland.[91]

As a result, flood retention areas in Colombo have drastically reduced with the use of wetlands and low-lying areas for waste disposal.[92] The current rate of wetland loss in the Colombo Metropolitan Region which is about 1.2 percent per year is alarming, given only 20 km^2 wetlands remains now.[93]

Management of Local Infrastructure and Services

The neglect of the built environment has also shown to add to disaster risks. Poorly maintained drainage and canal systems, blocked and broken drains, which could not cope with heavy volumes of water, were considered to have caused faster inundation and prolonged floods in 2010. Non-maintenance due to lack of clarity of ownership of some canals and the lack of clearance after the installation of transport and water supply infrastructure also contribute to blocked drainage systems. Urban Development Authority (UDA) officials are in the process of updating the Western Province Wetland Zoning plan and regulations developed in 2006 with the Sri Lanka Land Reclamation and Devevlopmet Corporation (SLLRDC), the CEA and other stakeholders. Further, unauthorised construction also obstructed water flow, and encroachment into designated water retention basins added to the problem. The badly flooded Gampaha and Ja-ela towns demonstrated this quite well[94] during the 2010 floods, even when Attanagalu Oya did not reach minor flood levels.

Solid Waste : Disposal of solid waste, especially MSW is a priority environmental issue and a national concern in Sri Lanka. The present island wide MSW is around 6500-7000 MT/Day. While 60 percent of this from the Western Province, Colombo district generates the highest (2000-2100 MT/day) followed by Gampaha district (900-1000 MT/day). Local Authorities collect around 50 percent (3500 MT) of unsorted

85 *MERE. 2014b. National Action Programme for Combatting Land Degradation in Sri Lanka.: 2015-2024. Ministry of Environment and Renewable Energy.*

86 *SLTDA, 2014, Annual Statistical Report, 2014.*

87 *DWC, 2013a, The First Island wide National Survey of Elephants in 2011.*

88 *Fernando P, 2015, Managing Elephants in Sri Lanka: Where We Are and Where We Need to Be.*

89 *IUCN Sri Lanka and the Central Environmental Authority, 2006. National Wetland Directory of Sri Lanka, Colombo, Sri Lanka*

90 *Emerton L and Kekulandala L, 2003, Assessment of the Economic Value of Muthurajawela Wetland.*

91 *Hettiarachchi M , et al, 2014, Urban wetlands and disaster resilience of Colombo, Sri Lanka.*

92 *Bandara N . 2008. Municipal Solid Waste Management-The Sri Lankan Case.*

93 *Source: Sri Lanka Land Reclamation and Development Corportion, 2015*

94 *MDM , 2011, Integrated Post Flood Assessment May 2010.*

SW, which is 62 percent biodegradable and only 7 percent is composted and 7 percent is recycled. The balance (85 percent) is collected is open dumps.[95]

The issue of MSW management is most acute in the Colombo Municipal Council area (CMC), where 15 percent of Sri Lanka's urban population resides.[96] In 2009, the CMC took over the Meethotaumulla dumpsite belonging to Kolonnawa Urban Council (KUC) using a Supreme Court Order. The dumpsite (0.8 hectares initially) receives over 700 MT of unsorted MSW, which includes chemical and clinical waste, each day and has expanded to 6.9 hectares over time. This site poses health risks and great inconveniences to people living in the area. The CMC had offered a voluntary relocation package of LKR 1.5 million (discussion with the KUC officials). Additionally, the Western Province Waste Management Authority has developed an interim plan and a Master Plan (2015-2020) for MSW management, to be implemented by the CMC. Several cases have been filed against CMC with regard to these issues and CEA has been requested to monitor the sites.[97]

Water sources : Two key rivers that flow through the six prioritised districts (of the PDNA) are important sources of water for the respective regions. The Kelani River, the third largest river in the country, helps to generate hydro-electricity at the upper catchment areas, as well as 17 water supply schemes along the lower catchment, providing 80 percent of drinking water to Colombo district. The Kelani River has been characterised as the most polluted river in the country and its degrading water quality has been identified through periodic monitoring by the CEA and National Water Supply and Drainage Board (NWS&DB),[98] which correlates this with industrial discharges of high polluting industries located along lower reaches of the river (Figure 15).

Flooding during rainy season and saline intrusion in the dry season are other major issues in the Kelani river. Historically, communities were quite prepared and had adapted to annual flooding, except for extreme flooding, which occurred once in about 20 years.[99] Sand extraction, estimated to be 600-800,000 m^3/year, is a contentious issue debated widely and is responsible for the sinking of the riverbed by about 10 cm per year,[100] with serious consequences such as salinity issues of drinking water.

The Deduru Oya, which flows mainly within North Western Province, Kurunegala and Puttalam Districts, gets such a varied rainfall that it may have flash floods during the rainy season and low flows during the dry season. The reservoir completed in 2014 at the upstream of Deduru Oya was expected to regulate river discharge and utilise water more effectively for irrigation and other purposes. Indiscriminate sand mining has serious environmental issues in the Deduru Oya basin and has been prohibited by the GoSL as of 2015. The groundwater table has fallen by 12-15m in some places, and up to 30m in others, with sand mining leading also to degradation of the river bed, erosion of the banks, and deterioration of the water quality.[101] Encroachment of the river buffer zone adds to the problems, including industrial pollution.[102]

95 *WMA , 2015, Present Status of Solid Waste Management System in Western Province.*

96 *Department of Census and Statistics, 2012, Census of Population and Housing 2012: Key Findings.*

97 *Refer http://efl.lk/portfolio-posts/6849/*

98 *Mallawatantri, A., A. Rodrigo and K. De Silva, 2016. Medium to Long-term Multi-Stakeholder Strategy and Action Plan for Management and Conservation of Kelani River Basin.*

99 *1967, 1989*

100 *Mahanama, 2015, Flood risk zone mapping of Kelani River basin in North of Colombo City.*

101 *Pereira,Kiran & Ratnayake, Ranjith. 2013. Curbing Illegal Sand Mining in Sri Lanka.*

102 *Lankanewsweb, 2015, Deduru Oya, at the brim of total destruction-wake up Good Governance.*

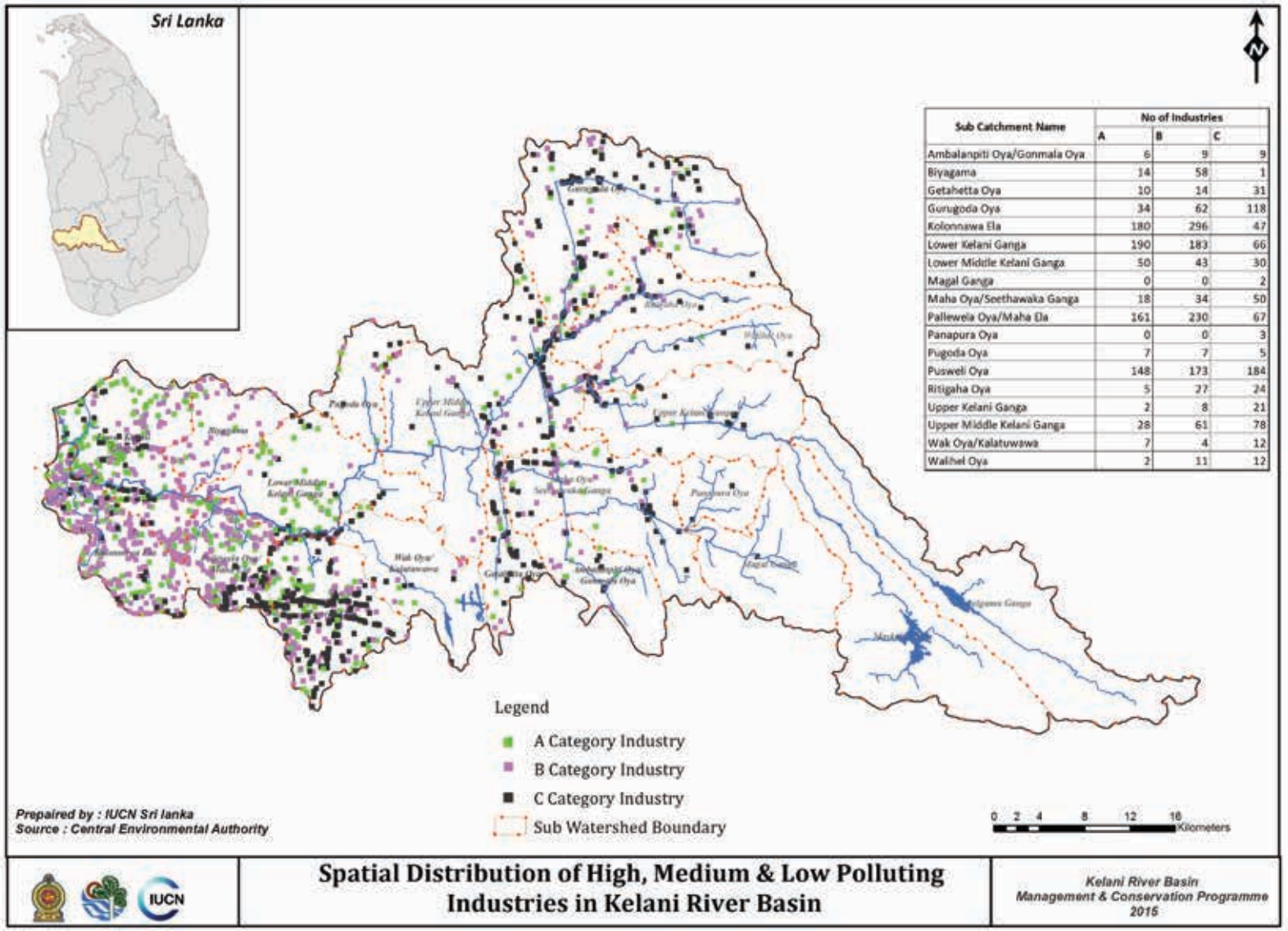


Figure 15. Spatial distribution of high, medium and low polluting industries in Kelani River basin. Source: Edussuriya and Pathirage, 2016.

Status of policy and institutional mechanisms and their implementations

The Ministry of Mahaweli Development and Environment (MMDE) is the policy making body with respect of environment management. With the introduction of National Environmental Act (NEA) in 1980 the need for conserving the country's environment was recognised in national planning and is highlighted in several policies, legislations and programs in the country. The Haritha (Green) Lanka Action Plan, Biodiversity Conservation Action Plan (BCAP) for Sri Lanka and the National Physical Planning Policy and Plan are prominent among them. A list of important environmental policies is given in Annex 14. Environment Sector.

The Central Environment Authority (CEA) is entrusted with wider regulatory powers under the NEA. Environmental Protection Licenses (EPL) are issued by the CEA to enforce relevant criteria and standards, and prescriptions arising out of EIAs (MMDE 2016b). Further, the National Adaptation Plan (2015) recognises adaptation to climate change across nine key vulnerable sectors; food security, water, coastal sector, health, human settlements, bio-diversity, tourism and recreation, export development and industry, energy-transportation,[103] while recognising cross-cutting national needs across sectors.

Gaps in institutional, technical and administrative capacities of respective institutions have prevented proper enforcement of the law and the result is the prevalence of numerous and complex environmental issues in the country.

Post-disaster Effects

Impacts in six districts prioritised as most affected by the PDNA can be clustered into three categories based on ecological and edaphic factors as indicated in Table 76.

Cluster	Ecological status	Impact
Colombo and Gampaha	Mainly built environment, with highly fragmented wetlands and forests	Urban floods from overflow of Kelani river and associated wetlands
Puttalam and Anuradhapura	Paddy lands with substantial dry zone forests	Floods due to release of water from small and medium reservoirs
Kegalle and Ratnapura	Mountainous areas with substantial cultivation of tea and other export crops, homesteads and rainforests	Floods and Landslides

Table 76. Ecological status and disaster impacts.

Floods in Colombo and Gampaha

The upper and the lower catchments of the Kelani River received high (250-350 mm) rainfall and the raised water level of the river obstructed the entry of water from lower catchment areas. The built environment, which has paid minimum considerations to natural drainage pathways, was a major cause of flood disaster. Detrimental implications of unplanned reclamation of wetlands in the western province were particularly highlighted during this disaster.

Leachate from MSW dumps and sewage from septic tanks got mixed with the floodwater adding to health risks, evidenced by an unbearable odour arising from stagnated floodwater. Dumping sites in Colombo and Gampaha were affected as some sites went under floodwater (e.g. Kaduwela), while others like Meethotamulla suffered partial collapse. The impacts of Meethotamulla and Ambuluwawa in Kandy were the visibly worse and caused secondary disasters. More than 500 families within five GNs in Kolonnawa were directly affected by floodwater carrying and depositing deteriorated SW from Meethotamulla dumpsite, as such, most household goods, especially mattresses and pillows had to be discarded.

103 Source: Ministry of Mahaweli Development and Environment, 2015

More than 8,000 MT of garbage was collected mostly from Kolonnawa, Kotikawatte and Kaduwela, the worst flood affected areas of Colombo. The Waste Management Unit of the Ministry of Provincial Councils and Local Authorities established an Operating Centre at the T. B. Ilangaratne Stadium, Gothatuwa to facilitate garbage collection. About 500 officials of the ministry and Sri Lanka Army, Police, Civil Defense Force, and local government assisted in the island wide waste and debris collection task. The waste, however, was not segregated and discarded at dumpsites belonging to Kottikawatte and Mulleriyawa Pradeshiya Sabahs (PSs).

Discharge of sludge and wastewater from several industries located within Kelani River basin as well as contamination of hazardous material due to the inundation of industries had also been reported. The CEA had to undertake several additional inspection missions to investigate pollution issues arising from this. Small industries usually collect their hazardous waste within their premises, until it can be sent for incineration. This contamination had occurred due to the accidental or deliberate[104] release of the waste. For example, bunds of wastewater treatment ponds of a garment factory in Pugoda were destroyed by floods and wastewater and sludge got mixed with drainage waters of nearby canals, which ultimately contaminated the Kelani waters.

Floods in Puttalam and Anuradhapura districts

Agriculture and forestry are the prominent land use pattern in Puttalam and Anuradhapura districts. The agriculture land use consists of rain fed paddy cultivation, which is supported by large numbers of small and large reservoirs constructed for multiple uses, including cultivation in the dry season.

Heavy rain caused overflow of the Deduru Oya (river) and the Thabbowa tank, affecting 15 Grama Niladhari (GN) divisions[105] (9,547 individuals; 2,668 families) within Chilaw Divisional Secretariat (DS) divisions alone. Community members at Nariyagama GN are of the view that floods and bank erosion along Deduru Oya has intensified after the construction of the dam as they experienced four severe flood incidences in: 2012, 2014, 2015, and this particular flood event. According to them the floodwater spread for about 3 km inland.

A community in Thambapanni village adjoining the Thabbowa Tank reported that the area gets flooded each year as a result of reduced capacity of the tank as well as sedimentation of two small streams (Kuda Oya and Nari Oya). Yet, the flood intensity of 2016 was quite high and the village was inundated for a week. Most of their paddy fields remain covered with sand.

According to the Secretary of the Ministry of Agriculture, the floods heavily damaged the paddy cultivation in the Anuradhapura (and Polonnaruwa) district. As the flood occurred with the start of the cropping season, the intensity of agro chemical contamination of floodwater (which in turn contaminates wetlands) could be substantial.

In addition to the direct impacts to crops from the flooding, a considerable extent of electric fences, erected to mitigate human-elephant conflict, was damaged during the floods, which increased incidences of elephants attacking crops in the post disaster period.

104 Source: Field visits

105 The lowest tier of the government administrative hierarchy

Landslides in Kegalle and Ratnapura districts

The high rainfall trigged several landslides in the Kegalle and Kandy districts, while minor slides also occurred in Ratnapura. The main landslide occurred in Aranayake, within the Kegalle District, which devastated three villages. The land destroyed by this event was 0.5 km^2 (see Table 77) and consisted of 29 percent homesteads, 32 percent tea plantations and 21 percent natural forest. According to landslide hazard zonation maps (LHZM) prepared by NBRO this is an area where 'landslides are most likely to occur'.

District	DS division	Land area affected	Land use	Sediment load ('000 m^3)	Threat of landslide re-occurrence	Proposed land utilisation
Kandy	Udunuwara (Ilukwatta Kadugannawa)	0.01km^2	Mixed vegetation and home gardens	900	Landslide could reactivate in top region	No settlement, natural vegetation
Kegalle	Dehiowita (Denswatta)	0.02km^2	Newly planted rubber	750	Landslide could reactivate in top region	No settlement, natural vegetation
	Aranayake (Siripura-Samasarakanda)	0.5 km^2 Length 2.26 km Width 174m-600m	Mixed vegetation & home gardens	7,000	Boulders and loosened soil due to recent landslide could move during rain. Some adjoining slopes too have become landslide risk areas	No settlements. Recommend forestation
	Bulathkohupitiya Kalupahana Estate	0.02km^2	Tea plantation	600	Landslide could reactivate in top region	No settlement, natural vegetation

Table 77. Status of the landslides in Kandy and Kegalle districts. Source: NBRO.

Summary of Damages and Losses

The environment sector sustained considerable damages, including those to the natural capital. Damages to resource base have not been monitored or captured accurately in the aftermath of disaster. No agency has shown adequate interest or taken initiative to collect information on damages to environment. As a result, damages to natural resources such as forests, wildlife, biodiversity, wetlands, land etc. are not known. During the PDNA an attempt to collect information, by cross-checking with other development sectors and talking to local officials and communities, was made. There was, however, a general lack of information and as such only descriptive accounts of damages could be captured.

Environment losses are difficult to calculate even when there is a fairly accurate estimate of damages. The absence of an account of damages in the current PDNA, made this an impossible task. Therefore damages to ecosystems could only be estimated through information/proxies. The approximate calculation of loss due to landslide in Aranayake utilising proxies is given in Table 78. It provides an insight to levels of economic losses related to damage to the environment. In this estimation, the Net Present Value of the loss has been calculated using 10 percent discount rate and 30 year time period, and includes ecosystem service values (carbon sequestration values and watershed protection values), values of non-timber forest products, and pharmaceutical prospecting values of natural forests.

Loss	Extent (ha)	Approximate Value LKR (Net Present Value)
Forest Plantation	0.243	1,077,917.28
Homestead	14.152	279,321,314.79
Natural Forest	10.064	158,098,176.65
Other Cultivation	5.374	20,171,661.51
Paddy	2.177	7,190,466.63
Rock	0.396	0.00
Rubber	0.012	42,426.67
Tea	15.722	54,942,543.85
Total	**48.14**	**520,844,507.38**

Table 78. Ecosystem service losses at Aranayake landslide.

The table below captures damages and losses that occurred to infrastructure and services related to areas under the purview of the DWC (Table 79 and Table 80).

Protected Area	Damage	Damage (LKR Million)
Thabbowa Sanctuary	60 km electric fence	15
Wilpattu National Park	24 km electric fence	6
	38 km road damage	1.9
	Dam of the Mahawewa Tank	4
Elephant Orphanage	Water pump and sedimentation	0.5
Total		**27.4**

Table 79. Infrastructure damage occurred within the following areas under the jurisdiction of DWC. Source: DWC.

Facility	Visitor Number		Income (LKR)		Estimated Loss of Income (LKR)
	May 2015	May 2016	May 2015	May 2016	
Elephant Orphanage, Kegalle	91,179	44,375	42,390,470	38,977,800	3,412,670
Botanical Gardens, Gampaha	19,107	15,056	920,215	739,190	181,025
Wilpattu National Park, Puttalam	4,319	2,558	1,736,980	1,432,850	304,130.00
Total					**3,897,825**

Table 80. Loss of Revenue to Department of Wildlife Conservation from Tourism in the affected areas. Source: D.WC

Apart from anecdotal evidence capturing losses due to contamination by MSW and its impacts on people, or losses due to industrial pollution in Colombo, it was also impossible to complete a clearer picture of the effects as no agency attempted to capture this information. Further damages also occurred to natural environment due to excessive release of chemicals used for containing pollution due to MSW and industrial related contamination, which could not be captured. Additional costs were also incurred for the disposal and containing of pollution due to increased waste generated during emergency operations.

The bulk of the destroyed houses and commercial establishments were in Colombo and Gampaha, giving rise to debris, part of which ended in sensitive ecosystems. The effects of the floods on the wetlands (under UDA and SLLRDC) or coastal ecosystems have not been assessed. The removal of debris using machinery to clean wetlands, waterways and coastal ecosystems is not captured or valued.
Waste collection within Colombo Municipality was not undertaken for more than a week, as the dumping

site at Methotamulla and access roads in Kolonnawa were flooded. An alternate site used temporarily in Narahenpita was inadequate as garbage started to pile on streets of Colombo and the Commissioner CMC had to resort to obtaining a Court Order once again to dump Colombo garbage in another dump site outside the municipal area (Karadiyana) until water levels in Meethotamulla receded.

Cross-cutting Issues

Environment concerns are cross-cutting in nature. This report emphasises the inclusion of environmentally sensitive approaches within build back better frameworks for recovery in all sectors e.g. adhering to land use regulations appropriate to the area, carrying out strategic environmental assessments, enforcing environmental impact assessment/initial environmental assessment during reconstruction in order to avoid future disasters.

It is also important to ensure that Green Village concept promoted by MMDE and Resilient Village concept promoted by MDM are conceptually joined together and undertake collaborative action. This would further strengthen local or community level disaster management initiatives to become more holistic and incorporate and address environmental concerns that have direct or indirect effect on disaster risk.

It is also extremely important that provincial and local authorities have adequate capacity and clear mandate to plan and implement environmentally sensitive post disaster recovery initiatives.

Affected communities should also be an active force in recovery, as their improved understanding of links between environment management and DRR would contribute significantly towards sustainable recovery. It is important to emphasise the inclusion of most vulnerable people too, as their awareness and commitments are extremely important especially to achieve medium and long-term recovery targets. There is ample evidence that women are more vulnerable to risks and impacted by disasters, and while women can also become a strong and reliable force of resilience building, it is important to ensure that women are included and given opportunity to lead and contribute to environmental recovery initiatives. Similarly children as future leaders and strong advocates should be targeted and included in environmental recovery plans in an appropriate manner.

Recovery and Reconstruction Strategy

The connection between environment, development and disasters is well established and currently is rarely disputed. Yet the multi-dimensional role of environment is not well understood and in most instances not accounted for in development. While it is often recognised that ecosystems are affected by disasters, it is forgotten that the protective aspect of ecosystem services provided by the ecosystem can save lives and protect productive and social assets. Inadequate attention paid to capture environmental related damages and losses during the early recovery period of the disaster emphasises the fact that environment is not well understood and adequately prioritised in the country.

Therefore initiatives must be taken by the Ministry of Mahaweli Development and Environment to ensure that a system is in place to monitor and collect data on environmental impacts following a natural disaster in collaboration with other relevant agencies and the Ministry of Disaster Management. It is necessary to provide relevant agencies with guidelines and training. For example, a systematic collection of baseline data and production of GIS mapping and modelling scenarios for identification of high risk areas within River basins of Kelani, Attanagalu and Deduru Oya needs to be undertaken (e.g. Pollution and sediment loads to river basins from different source categories, river bank erosion, flood vulnerability etc.).

The recovery strategy presented in the table below provides only a very conservative estimate of cost of

the proposed strategy, as the environment can only recover well in the long term, and lack of data makes it difficult to understand real extent of damage to propose more recovery options. Further as a cross cutting issue, environmental concerns are adhered into other development sectors. Therefore, the estimated cost provided in Table 81 is based on recommendations presented below and only addresses post recovery needs of quantifiable environmental issues.

Recovery and Reconstruction Needs with Costs

Issue	Recover Needs (LKR Million)			
	Short-term	Medium-term	Long-term	Total
Mechanism for Mainstreaming Data Collection and Monitoring.	4	5.5	4	13.5
Mandatory Disaster Risk Reduction planning and implementing by the industry with the support of CEA.	1	5	5	11
Advocate CMC to implement Interim Plan for Meethotamulla and develop guidelines for risk reduction in existing dump sites.	10	30	20	60
Develop and introduce risk zoning in landscapes with land use guidelines and training LA officials.	15	50	40	105
Incorporate Disaster Risk management into the management plans of Protected Areas and Wildlife sanctuaries, elephant orphanages and parks.	0	5	3	8
Habitat improvement in remaining wetlands and protected areas particularly in Colombo, Gampaha, Puttalam and Anuradhapura to provide flood protection function.	8	10	15	33
Total	**38**	**105.5**	**87**	**230.5**

Table 81. Environment recovery and reconstruction needs.

Recommendations

- Mandate industries to develop and implement a disaster risk reduction plan, which includes emergency operational plans that also contain preventing environmental contamination during an emergency/ disaster situation. Ideally this could be linked to the issue of Environmental Protection Licenses by CEA.
- Urgent attention needs to be paid to the highly controversial issue of MSW dumping sites such as Meethotamulla and Karadiyana (including Ambuluwawa in Kandy district). Ministry of Local Government and Provincial Councils together with the Ministry of Mahaweli Development and Environment (CEA providing technical inputs) need take the leadership to set in motion an appropriate process to come up with practical and a sustainable solution in collaboration with other relevant stakeholders.
- An advocacy campaign and a system must be launched to ensure that the Colombo Municipal Council urgently implements the Interim Plan developed by the Western Province Waste Management Authority to address the issue of Meethotamulla dump. As prescribed in the interim plan CMC must immediately advocate 3R (Reduce, Reuse and Recycle) and enforce disaggregation of waste in the Colombo municipal area, which will drastically reduce pressure on the dump.
- Similarly, systems for waste management should be introduced to other urban areas, while giving priority to addressing the issue of Ambuluwawa waste dump.
- Undertake comprehensive socio-economic and environment studies to understand impacts of open dumping of Solid waste at Meethotamulla etc. and incorporate the findings of these studies into designing the above mentioned waste management systems.
- Municipalities must find ways to implement environmentally sensitive municipal waste management.

Colombo Municipality as the largest generator of MSW, to take the leadership to demonstrate effective reducing, recycling, re-using options to minimise waste generation and source separation for effective MSW as envisaged through the interim plan developed for Meethoutamulla by the Western Province Waste Management Authority.

- Advocate to strictly implement regulations related to land use in environment sensitive areas (Kelani River and Deduru Oya bank reservations) and transform areas released through resettlements into protected zones (e.g. forests) or sustainable public service areas (e.g. walking paths).
- High-risk zones for landslides released due to the relocation of at risk communities, to be converted into stabilised landscapes (e.g. forest or controlled cultivation) with restricted access to communities. Bioengineering Technologies could be utilised in this regard.
- Create awareness, communicate zoning recommendations and associated land use practices to Local Authorities for effective implementation. Local Authorities should in turn facilitate and enforce land use practices.
- Clarify roles and assign clear responsibilities to relevant agencies to ensure proper maintenance of canals and wetlands in the Western Province.
- Control riverbank erosion by strictly implementing laws for prevention of sand mining and using appropriate bank stabilisation measures. Advocate shifting towards environmental sensitive development approaches by utilising existing tools such as Strategic Environmental Assessments, River basin/landscape approaches.
- Incorporation of Disaster Risk management into the management plans of Wilpattu National Park. This will assist to reduce disaster risk on humans, biodiversity and infrastructure.
- Habitat enrichment and eradication of invasive species, preferably based on in depth environment assessments to assess ecological damage caused by floods;
    - Willpattu National Park and Thabbowa Sanctuary, to reduce Human Elephant Conflict.
    - Wetland in Colombo and Gampaha.

Implementation Strategy for Recovery

As mentioned above, environment management has direct links with disaster risk reduction. The Ministry of Mahaweli Development and Environment and Ministry of Disaster Management have already identified this and promoted enabling strategies: Sri Lanka Comprehensive Disaster Management Programme, National climate change policy, Haritha Lanka and Sri Lanka Next, Blue-Green Era programmes, National Adaptation Plan for Climate Change in Sri Lanka (2015-25), INDCs (Intended Nationally Determined Commitment to reduce Carbon emissions) of Sri Lanka which includes commitments to sustainable waste management and, restoration and protection of ecosystems e.g. Forests, wetlands. Further, the implementation of NBSAP, land use policy, National Action Plan for combatting land degradation (UN Convention on Combatting Desertification), commitments SDGs and Paris agreement 2015 etc. are all inline with environment protection and DRR.

The MMDE will work with MDM to incorporate recovery strategies to strengthen relevant development initiatives. MNPEA should support MMDE and MDM in this endeavour by directing the review sectoral development plans to include and prioritise PDNA recommendations, especially during future budget discussions.

Sector Assessment Methodology

The assessment comprised of accessing available data from agencies, such as NBRO, CEA, DWC, FCD, and Local Authorities in attempting to capture the extent of damages and losses to the environment sector. However, the main source of information to compile this report was through stakeholder and focus group discussions in priority districts. A list of key informants is provided in the Environment section of Annex 1. PDNA Sector Teams and Contributors.

Constraints

Lack of data to determine environmental damages and loses and no responsible agency/agencies for this initiative etc. were constraints mentioned in the report, especially in the section "Summary of damages and losses". One of the serious challenges to compile this report was the difficulty in accessing available data as well as the lack of important baseline information. It is important to note that this issue has been recognised by the IPFA report about the 2010 flood event.

This report also highlights the lack of a designated agency with the task of monitoring or collecting data on environmental impacts following a natural disaster. The present study endorses these recommendations too.

It is important to emphasise that more comprehensive assessments are required to provide a more complete picture on the situation.

Disaster Risk Reduction

Executive Summary

The floods and landslides caused destruction of public and private infrastructure, including houses, roads, schools and health facilities, with extensive impacts on the agriculture, small and medium enterprises and other sectors.

There is no major damage to the Disaster Risk Management infrastructure. However, losses have been estimated based on the expenditure incurred by the government for response activities, including costs for relief distribution, camp management, and logistics expenditure. The total amount of damages and losses are estimated as LKR 394.36 million.

The May 2016 disasters highlighted a series of shortfalls in the disaster risk management of the country-mostly in last mile early warning dissemination, in disaster response at local level, community preparedness in urban areas, information management and coordination among stakeholders.

Recovery of the DRR sector includes a range of interventions that have to be implemented in the short, medium and long term in 3 areas: a) enhancing coordinated preparedness and response systems; b) Institutional capacity building at the local level; and c) Inclusion of all vulnerable groups under social protection schemes.

The recovery needs are identified as follows:

a. Strengthening community-based disaster preparedness and risk awareness in most vulnerable GN divisions in Gampaha, Colombo, Kegalle and Puttalam districts
b. Strengthening local level elements of early warning systems in Gampaha, Colombo, Kegalle and Puttalam districts
c. Mainstreaming DRR in to post disaster recovery programmes
d. Strengthen local level governance for resilient disaster recovery and rebuilding
e. Strengthening Data and information management in DRM (both pre and post disaster)
f. Expand insurance for the sectors not covered under the NITF

The estimated cost of the recovery needs in DRR amounts to LKR 320 million.

Pre-disaster Context and Baseline

Sri Lanka Risk Profile

Sri Lanka is prone to a multitude of hazards and the country's disaster profile is characterised by high frequency-low/moderate severity as well as low frequency-high severity events. Floods, cyclones, landslides and drought are amongst most common occurrences and sit at the top of the disaster profile of the country. Localised hazards including lightning strikes, epidemics and the human-elephant conflict are also frequently observed. Increased extensive risks caused by ill-planned regional and urban development, environmental degradation are still an invisible layer of risks. However, a recent World Bank study shows that an estimated US$ 380 million is annually lost due to disasters, especially due to floods, which accounts for US$ 240 million[106] losses annually.

106 World Bank, 2015, Sri Lanka: Ending poverty and promoting shared prosperity-a systematic country diagnostic.

The National Adaptation Plan for Climate Change Impact in Sri Lanka: 2016 to 2025[107] highlights the increased vulnerability of human settlements to the impacts of climate change in Sri Lanka. According to this plan, the increased frequency and intensity of floods will cause extensive asset loss/damage and displacement of people, particularly the poor. Flood conditions will cause erosion and physical damage to infrastructure and public utilities imposing significant burden on both individual households and the national economy.

Flood Hazard

Floods are a common occurrence in Sri Lanka and during the period from 2000 to 2015 floods have impacted 23 out of 25 districts.[108] Major floods are associated with the two monsoon seasons, south-west monsoon (May to September) and northeast monsoon. A combination of many factors, such as intense monsoon rainfall, topography, rapid urbanisation, encroachment of water ways, inadequate maintenance of rivers and canal system, have exacerbated to this situation. Formation of sand barriers across the river outlets during the dry periods further aggravates the situation.

Batticaloa, Ampara, Colombo, Gampaha, Kalutara and Ratnapura districts are among most affected due to floods during the last 40 years. Ampara and Batticaloa districts mainly experience reservoir floods; while unplanned urbanisation, establishment of settlements in flood prone areas, poor attention to potential flood risk in infrastructure development and inadequate maintenance of storm water drainage systems are the main contributory factors for floods in Colombo and Gampaha districts.

Landslide Hazard

The occurrence of landslides has become a frequent natural phenomenon in the hill country, causing loss of life and severe property damages. Landslides in urban centres in the hill country, where human settlements and infrastructure facilities are concentrated, have a greater adverse economic impact. Nearly 20,000 km^2 (30 percent area of the country) covering ten administrative districts (Badulla, Nuwara Eliya, Matale, Kandy, Kegalle, Ratnapura, Kalutara, Galle, Matara and Hambantota) are considered to be highly prone to landslides. In addition, cutting failures, land subsidence and rock falls are also accounted under land movement.[109] In the past 40 years, a significant number of people in Sabaragamuwa and Central provinces were affected by landslides. The main factor contributing to the landslides is the inappropriate land use planning and practices associated with the rapid development process of the country.

Urban Disaster Risks: An emerging vulnerability pattern

Sri Lanka is on a path of rapid urbanisation. Before 1980s, the urban growth rate of major cities, including Colombo, was below 1 percent and since mid-1980s Colombo has experienced a rapid growth of its wider suburban areas, with the Colombo district experiencing a population growth of 31 percent between 1981 and 2002 and the urban population rising to over 60 percent. Sri Lanka is expected to become a predominantly urban country, with 70 percent of its population living in urban areas by 2030.[110]

107 MMDE, 2015, National Adaptation Plan for Climate Change Impact in Sri Lanka: 2016 to 2025.

108 Based on the Desinventar.lk database

109 NBRO, 2015, A study on the Resettlement Planning Process Applied in Post Landslide disaster Resettlement Project in Sri Lanka.

110 Department of National Planning, 2010, The Development of Policy Framework, Ministry of Finance and Planning, Government of Sri Lanka.

Increased vulnerability to floods due to urbanisation

Urbanisation is accompanied by increasingly larger-scale urban-spatial expansion as cities and towns. Urban expansion alters the natural landscape, land uses and land cover, resulting in increased urban floods. There are no proper controls and enforcement in place to address impacts of natural hazards in recent rapid development in urban areas.

With the current rapid urbanisation trend in Sri Lanka, a new pattern of vulnerability to disasters is emerging. Whilst the Government's Mid-Term Development Framework recognised the positive impact of urbanisation, around 70 percent of this population and 80 percent of national economic infrastructure is concentrated in coastal cities and cities in disaster-prone hilly areas. These cities are highly vulnerable to disasters and predicted climate change impacts, including sea level rise, storm surges, floods, landslides and dengue epidemics; all of which negatively impact human settlements, city productivity and service delivery, especially for the poor. The increase in the frequency and intensity of disasters caused by natural hazards over the past few years has resulted in major socio-economic impacts in both urban and rural areas, especially in disaster prone provinces.

DRM Legal and Institutional Arrangements

In Sri Lanka, a wide range of institutional, legislative and policy measures, have been put in place since the enactment of Sri Lanka Disaster Management Act No.13 of 2005, which provides the legal basis for instituting a disaster risk management (DRM) system in the country.

The Sri Lanka Disaster Management Act No. 13 of 2005 established the Disaster Management Centre (DMC) in 2005 under the National Council for Disaster Management (NCDM) chaired by H.E. the President of Sri Lanka, as the apex body for the purpose of planning, coordinating and implementing of disaster management initiatives. Some of the principle functions of the DMC under the said Act are preparation of the National Disaster Management Policy, National Disaster Management Plan, the National Emergency Operation Plan and assisting all Ministries, government departments and public corporations to prepare Disaster Management Plans. The DMC is also responsible for issuing instructions and guidelines to appropriate organisations, non-governmental organisations, district secretaries and divisional secretaries on activities relating to disaster management.

In December 2005, a separate Ministry for Disaster Management was established. Currently, the Disaster Management Centre, NBRO, NDRSC and the Department of Meteorology (DoM) are functioning under the purview of the Ministry. Through the Act H.E. the President is empowered to declare state of disaster depending on the severity of the event.

DRM Financing

Analysis of budget estimates from 2013 to 2016 reveals that the total allocation for direct interventions related to Disaster Management activities by agencies under the purview of the Ministry varies from 0.05 percent to 0.11 percent against the total annual budget.

Description		Annual expenditure in LKR Millions			
		2013	2014	2015	2016
Budgetary Allocation of agencies under the MDM	DMC	698	1,806	920	978
	NDRSC	425	2,379*	1485	582
	NBRO	116	983	551	669
	DoM	46	43	603	324
Total annual budget of the government		2,566,996	2,599,000	3,338,000	3,699,000
Allocation for DM as % against total annual budget of the government		**0.05**	**0.11**	**0.11**	**0.07**

Table 82. Percentage of annual allocation for DM against the total budget, 2013-2016. Source: Annual Budget Estimates-Ministry of Finance & Planning

The World Bank stated in 2015 that "annual expected sector-specific loss from natural disasters represents 0.50 percent of Sri Lanka's GDP and is equivalent to 3 percent of total government expenditure".[111] This reflects the need for an increased allocation for disaster risk reduction of the country in the future.

Disaster Risk Financing Instruments

Insurance & Catastrophic Drawdown Option

The Government of Sri Lanka has two major disaster risk financing instruments. The first is the National Insurance Trust Fund (NITF) and the second is a credit line with a Catastrophic Drawdown Option (CAT-DDO)

The Ministry of Finance, on behalf of the government, entered into an agreement with the NITF to establish an Insurance Policy to cover against disasters caused by natural hazards in the country, except for drought. The scheme is managed by the NITF and NDRSC. This insurance policy does not cover crop losses in agricultural sector as it has already been covered through the crop insurance scheme. The annual premium, which is borne by the government is LKR 300 million for a maximum coverage of LKR 10 billion. Within the maximum coverage, LKR 1.5 billion is allocated for emergency relief expenses and LKR 8.5 billion for property (housing), content and SME's which has an annual turnover less than LKR 10.0 million. The maximum amount payable to an individual property is LKR 2.5 million. The maximum limit for emergency relief varies depending on the type of disaster, such as LKR 25 million for landslides and LKR 500 million for tsunamis.

In addition to the NITF, the government has made an arrangement with the World Bank to establish a Development Policy Loan (DPL) as a contingent line of credit, with a Catastrophic Drawdown Option (CAT-DDO). The Cabinet of Ministers has approved the establishment of a DPL facility with CAT-DDO up to $ 102 million, which came into effect from 2014.[112] The Government has to declare a state of disaster to activate the above-mentioned facility. The fund can be drawn over a period of three years, and may be renewed up to an additional four times, for a total of 15 years.

111 *World Bank, 2016, Fiscal disaster risk assessment and risk financing options Sri Lanka.*

112 *Source: Annual Report 2014-Ministry of Disaster Management*

Disaster Preparedness

The DMC has developed disaster preparedness plans for response in all 25 districts, 187 Divisional Secretariat divisions and 445 Grama Niladhari (GN) divisions. In the Colombo district alone preparedness plans are available for 88 out of 567 GN divisions. GN level preparedness plans are developed by the GN level committees and sub committees on Early Warning, Search & Rescue, Health, Security and Camp Management, are appointed to respond to disasters. Being the most populated districts, Colombo and Gampaha had recorded the highest number of safety centres during the May 2016 floods. 78 Safe centres had been established within the two districts in schools, religious places and community centres. However those were not adequately equipped to meet the basic needs of large numbers of displaced people, which shows inadequacy in local level disaster preparedness, especially in urban settlements. Rapid needs assessment conducted just after the disaster revealed that Kaduwela Divisional Secretariat Division of Colombo district had 19,069 displaced people, accommodated in 15 safe centres. In some centres, the number of displaced had exceeded 5,000 at the peak time of the floods.

DRR Risk Assessment Capacity

Many geographical areas of Sri Lanka are exposed to natural and human induced hazards, particularly to hydro-meteorological hazards with different spatial and temporal characteristics. With this background, in 2011, the DMC developed hazard profiles for major hazards including floods, droughts, landslides, coastal erosion, cyclones, sea surges, sea level rise, tsunamis and lightning. However, these had limitations in terms of the scale (national level) and were developed only for specific scenarios. For instance, flood hazard maps have been prepared only for one flood scenario that covers four river basins. Additionally, vulnerability assessments/mapping are yet to be done, thus comprehensive risk profiles are not available for the country.

Flood control structure in Sri Lanka

There are seven major rivers[113] with 13 river basins running through the five districts of Colombo, Kalutara, Gampaha, Galle and Matara. The two major rivers running through Colombo and Kalutara, the Kelani River and the Kalu Ganga, have major flood levees on both the right and left banks to protect the city of Colombo and suburbs. These two inter-provincial rivers are linked by the Bolgoda Lake, which has an estuary with two large lakes and two sea outfalls in Panadura and Kalutara.

The Bentara Ganga river basin lies bordering the Kalutara and Galle districts and the Western and Southern provinces. The two rivers, the Gin Ganga and Nilwala Ganga, running through Galle and Matara districts have flood regulation pumping stations and flood levees built during the late 1970's and 1980's, along the lower flood plain.

Out of the five districts, the Gampaha district contains a major technical irrigation scheme-the Attanagalu Oya Irrigation System. Three rivers, namely the Dee-Eli Oya, Attanagalu Oya and Uruwal Oya, constitute the Attangalu Oya irrigation system and is located between the Kelani River and Maha Oya river basins. There are 10 major anicut schemes, with 24 smaller anicuts throughout the system. There are also a number of rain-fed, minor and medium irrigation projects within the basin and in the Gampaha district.

The upper reaches between the main Attangalu Oya and the Kelani River (Dompe and Malwana areas and lands bordering Mabole, Wattala, Peliyagoda and Kelaniya) drain into the Kelani River and these areas are protected by minor flood protection levees and control gates. Kelaniya has a major flood protection levee, almost 5km long, along the right bank of the Kelani River.

113 The Attangalu Oya, the Kelani Ganga, the Kalu Ganga, Bolgoda Lake, the Bentara Ganga, the Gin Ganga and the Nilwala Ganga.

The Kelani River Flood Protection System

The Kelani River flood protection schemes were developed adjacent to the river to protect the low lying areas in Peliyagoda and Kelaniya DS divisions in Gampaha districts and Kolonnawa and part of Kaduwela DS divisions in Colombo district, by constructing a series of levees along the river. Drainage of storm water from the interior catchments of the protected areas is mainly dependant on natural flow due to gravity. The main feature of the flood protection system is the north and south embankments on both sides of the river. These schemes successfully minimised floods in the low lying areas of the Kelani River basin for a long period, except on few occasions, where overspill or failure of flood bunds was experienced.

As such, Colombo city and its suburbs face two types of floods: floods caused by overflowing of the Kelani River (riverine floods) and floods caused by blocked drainage (urban floods).

Post-disaster effects

The Disaster Event

An extreme weather forecast warning was issued by the Department of Meteorology on May 14, 2016 stating heavy storms (above 150 mm) could be expected over the North Western and the Western parts of the country. On May 15, 2016, the South-Western, Northern and North-Central parts of the country received extremely heavy rainfall with some areas experiencing rainfall in excess of 300 mm. Some of the areas that received notable rainfall on the May 15, 2016 are, Kilinochchi-373 mm; Pulmuddai-317 mm; Colombo-257 mm; Katunayake-262 mm; Vavuniya-203 mm; Norton Bridge-202 mm; Laxapana-258 mm. The catchment area of the Kelani River received an average rainfall of about 300 mm on this day.

A significant feature of the rainfall on May 15 was that both the Upper and the Lower parts of the Kelani river catchment received rainfall in the range 250-350 mm. Higher rainfall in the upper parts of the catchment raised the water levels of the Kelani river, obstructing the rain water in the lower parts of the catchment from entering the river. This aggravated the flood situation in Colombo and Gampaha districts. The highest water level of the Kelani River at Nagalagam Street during this event was 7.65 feet observed at 4.00 pm on May 19, 2016.

As a result of intense rains, reservoirs in many parts of the country came up to the overspill level within a very short period of time and the Department of Irrigation had to open the gates of a number of major reservoirs to control water levels and minimise damages to reservoir dams. This resulted in significant increases to water levels and overtopping in minor tanks, reservoirs and rivers, which caused major inundation in many parts of these districts.

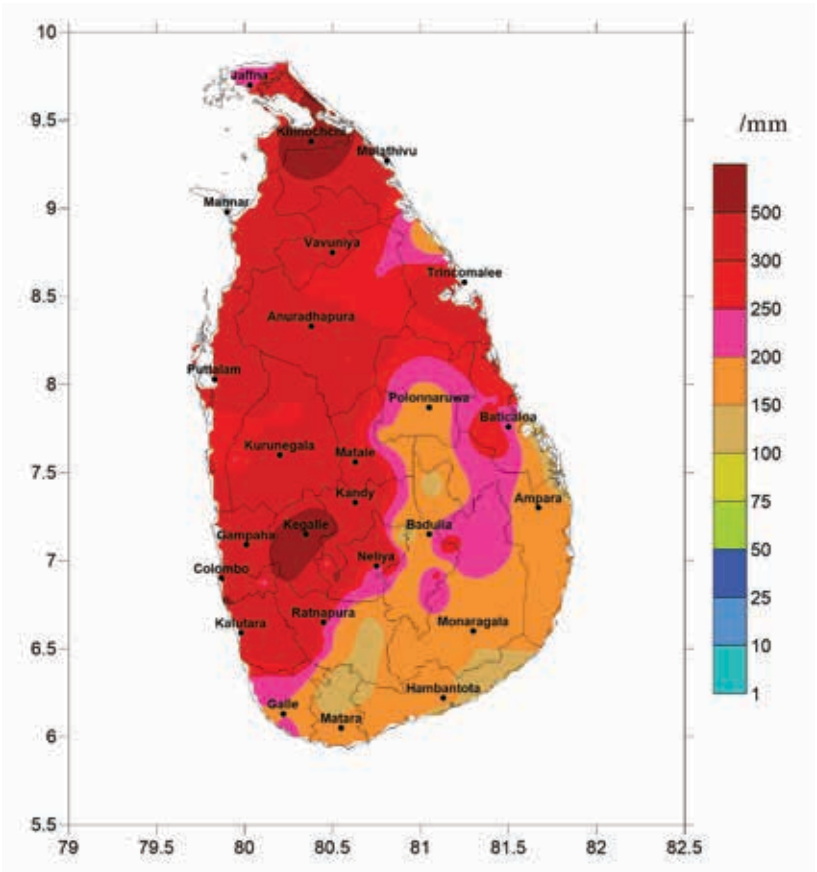


Figure 16. Weekly accumulated rainfall amount from 12 to18 May 2016 (mm). Source: Department of Meteorology.

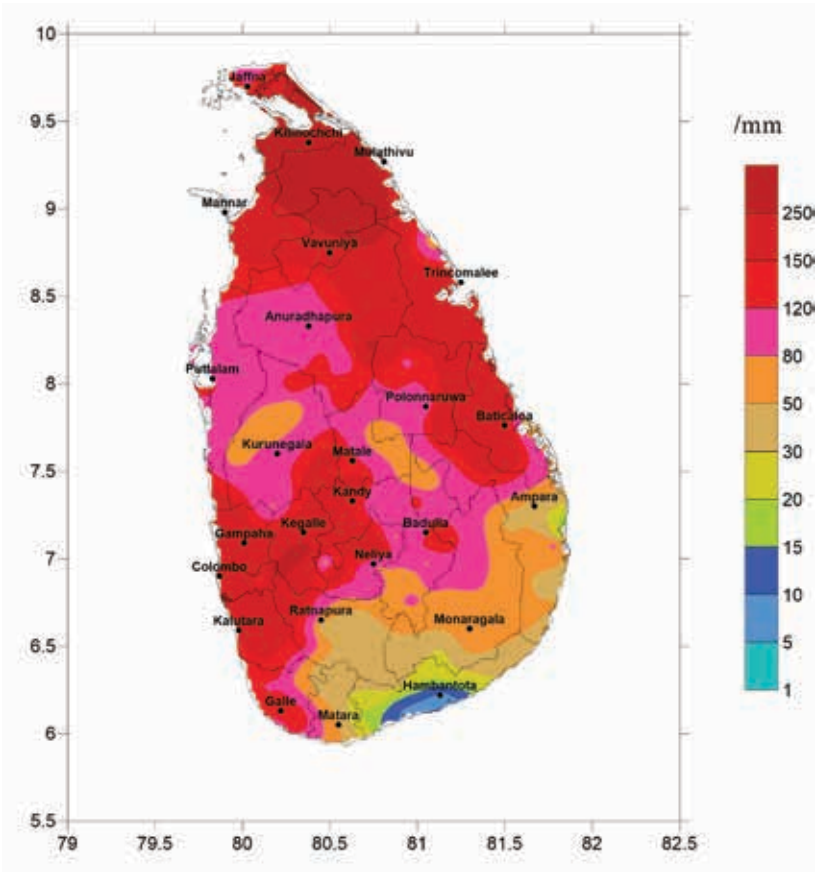


Figure 17. Total rainfall on 15 May 2016 (mm). Source: Department of Meteorology.

Landslides

The torrential rain between May 14 and 16 destabilised hillsides in many areas, particularly in the Kegalle District of the Sabaragamuwa Province, triggering multiple landslides. At least seven landslides occurred in the province. The landslides buried and completely destroyed the homes of 72 families in the villages of Siripura, Pallebage and Elagipitya.[114]

National and International Response

The Presidential Task Force for disaster management chaired by H.E. the President, represented by the Prime Minister, Cabinet Ministers of relevant Ministries, Provincial Chief Ministers, Secretaries of Ministries, heads of armed forces and Police, United Nations and other relevant stakeholders met on May 23, 2016, soon after the disaster, to discuss on relief coordination and strategising for recovery. A State of Disaster was declared in six provinces in the country on May 30, 2016. Upon declaration of state of disaster, Catastrophic Deferred Drawdown Option (CAT DDO) was activated allowing the government to draw up to 102 million US$ for emergency response activities.

The Ministry of Disaster Management coordinated the emergency response activities with all relevant agencies in providing life-saving support to the affected communities. The Sri Lanka Army, Navy, Air Force and the Police were crucial in conducting search and rescue, safe evacuation, relief distribution including reconnaissance missions, food drops, providing safety and security during the emergency period.

Provision of Relief for the Affected People

The DMC coordinated with the Tri-service Forces and the Police to mobilise personnel for search and rescue operations in landslide and flood affected areas. The Ministry of Disaster Management immediately released LKR 15,000 as funeral assistance to the families of the deceased. The balance amount of LKR 85,000 for a deceased is being released by the National Insurance Trust Fund on presenting death certificates. In addition to the above, the Treasury allocated LKR 150 million to cover expenses, which are not covered under the National Insurance Trust Fund. These funds were channelled through District Secretaries.

NDRSC officers based in the disaster-affected Divisional Secretariat (DS) divisions were carrying out emergency relief operations and setting up camps where needed. These officials under the instructions of the Divisional Secretaries took necessary measures to provide facilities to the affected communities. As the extent of the damage unfolded, the NDRSC deployed additional staff from other divisions to severely affected divisions in Colombo, Gampaha and Kegalle districts.

The MDM conducted a Rapid Needs Assessment with UN and NGOs in five highly affected districts: Colombo, Gampaha, Kegalle, Puttalam and Ratnapura. Based on the findings, relief distribution was coordinated and decisions were made to address the situation.

114 Source: NDRSC, 2016

District	Received Funds from NITF (LKR)	Received Funds from Treasury (LKR)	Total released (LKR)
Ratnapura	5,000,000.00	1,000,000.00	6,000,000.00
Colombo	54,610,126.50	54,067,486.27	108,677,612.77
Kurunegala	5,800,000.00	954,460.00	6,754,460.00
Puttalam	9,832,046.50	800,000.00	10,632,046.50
Nuwara Eliya	2,102,756.00		2,102,756.00
Kegalle	12,400,000.00	50,082,750.00	62,482,750.00
Kalutara	1,691,301.12	100,000.00	1,791,301.12
Gampaha	32,057,049.76	1,650,000.00	33,707,049.76
Kandy	3,100,000.00	2,451,977.00	5,551,977.00
Mannar	5,500,000.00		5,500,000.00
Jaffna	606,038.25		606,038.25
Galle	700,000.00		700,000.00
Kilinochchi	3,276,508.25		3,276,508.25
Anuradhapura	3,000,000.00		3,000,000.00
Matale	184,425.00	70,000.00	254,425.00
Vavuniya	3,000,000.00		3,000,000.00
Mullaitivu	1,982,872.30		1,982,872.30
Badulla	100,000.00		100,000.00
NDRSC		13,887,679.83	13,887,679.83
Total	**144,943,123.68**	**125,064,353.10**	**270,007,476.78**

Table 83. Emergency relief funds released by the NITF and Treasury. Source: NDRSC.

In addition to government efforts, UN agencies, NGOs, different donors, media, private sector organisations and general public were actively involved in collection and distribution of urgently needed relief items.

Many agencies immediately activated their international humanitarian response funds and mobilised approximately LKR 850 million[115] to assist the Government in providing urgent life-saving assistance to the severely affected communities. These include clean water, non-food items (tents, tarpaulins, bed sheets, mats etc.), mobile toilets, sanitation and hygiene facilities, protection and psychosocial support, particularly for the affected-children.

Analysis of the DRM systems after the floods and Landslides

Hazard Monitoring and Warning Dissemination

On May 5, 2016, DMC convened the regular Monsoon Forum, which is an initiative by the DMC to improve coordination amongst all relevant partners. This Forum provides a climate outlook to all stakeholder agencies including the Department of Irrigation, Ministry of Health and discusses the emergency operations process in an emergency due to any unexpected weather systems. In parallel to the national level Monsoon Forum, districts monsoon forums are organised under the leadership of respective district secretaries.

The Department of Irrigation sent a flood warning to the Emergency Operations Centre of the DMC, and as the water levels were rising in the Kelani River, the DMC alerted and issued evacuation orders to the general public via mass media and SMS. The NBRO monitored and issued warning on landslides based on the information received from the automated rain gauge system established in high-risk areas. In addition, NBRO had also provided manual rain gauges to the communities in high-risk areas and provided them

115 *See Annex 15. Disaster Risk Reduction including Urban Risks on for the total humanitarian relief expenditure during the disaster period.*

with the required awareness on measuring rainfall to make decisions on evacuating based on the threshold levels.

Main shortfalls identified in Early Warning Systems (EWS)

The effectiveness of the EWS does not exclusively depend on the scientific identification, analysis and dissemination of the warning, but also the timely action by its intended audience.

While the Department of Meteorology issued alerts on high rainfall, it did not issue specific warning on severity and extent of flooding and therefore the authorities did not have sufficient information to alert general public. Even after the warning was issued, the public did not take these alerts seriously, possibly due to lack of awareness or the unclear nature of the alert messages or the warning contradicted with their traditional knowledge. It was also reported that many families or one member of the families opted to stay at their inundated houses for the purpose of protecting the property and assets. Early warning messages did not classify severity of floods in a language understood by the communities. Additionally, no instruction on how to respond (evacuation plan, temporary shelter for displaced people to these floods) was clearly communicated to the population.

Due to lack of feedback system of early warning messages at community level, it was difficult for the DMC to confirm the receipt of the messages. The absence of risk profiles and appropriate technology further made it difficult to provide area specific warnings with clear guidance for personal safety to the affected communities.

Main shortfalls in disaster response

The scale of the floods and landslides in terms of geographical coverage and number of displacement/ casualties was unprecedented. This was the first time in many years that the urban hubs of Colombo and Gampaha districts were severely affected by floods, disrupting the majority of socio-economic activities and causing damages to physical assets. As a result, preparedness to cope with urban disasters was limited at all administrative levels in the country from national authorities to community levels.

Following are some issues observed in the overall emergency response management during May 2016:

- The opportunity to operationalise and pilot test the recently developed National Emergency Operations Plan (NEOP) to identify and strengthen any weaknesses in the system was missed.
- There were no community-based disaster risk management schemes, particularly in urban setting.
- Some of the designated safety and evacuation centres were flooded and could not be used.
- The exact number of the affected people in the safety centres could not be ascertained due to inadequate camp management system especially in urban areas. Lack of gender and age disaggregated data in most locations, resulted in non-provision of targeted assistance to meet actual needs of a large number of displaced people.
- In many hard-to-access areas, food distribution was minimal during initial few days.
- Non-availability of adequate number of boats, safety gear and skilled personnel with the Navy hamper the search and rescue operations.
- Coordination between the military and the civilian authorities were limited particularly at the grassroots level which hindered efficient and timely evacuation of some highly vulnerable families from flooded areas.

- As current disaster management regulations allows payment of compensation only for property damages and damaged housing structures, tenants who are occupying the house and thus sustained losses of household assets would not be compensated.
- Young girls and other migrants from rural areas living in congested boarding houses in the Free Trade Zone in Biyagama, Gampaha divisions were not eligible to receive assistance due to the lack of specific guidance in assistance for tenants.

Shortfalls in Data, Communication and Information Management

It is widely acknowledged that information and communication between authorities and the general public and communities is crucial. It has to be a two-way communication. The lack of a planned communication strategy often leads to misinformation, negative publicity and criticism of the Government, as was the case in this disaster. While the Government relied on formal channels of communication through TV and print media, it largely ignored social media, which is increasingly the tool for communication to mobilise support, inform the general public and receive feedback on the needs and challenges in the disaster. There were some successful initiatives organised by tech-savvy citizens, who organised the response through the Internet and social media.[116] The social media could be utilised as a means to respond to disasters.

Additionally, lack of accurate, real-time and gender/age/disability segregated information on the number of affected/displaced people; locations of safety centres; who was providing what type of relief assistance and where etc.; was reported as one of the main issues faced by many Government and non-government actors involved in emergency response. This caused wastage of some items as well as no relief being provided in some locations. Furthermore, lack of accurate gender, age and disability segregated data on disaster impact hampered efficient and satisfactory response to the needs of these highly vulnerable groups of people as well, as the conducting of proper assessment of the impacts of the disaster on these vulnerable groups.

Summary of Damages and Losses

Damages

Damages considered in this sector are those observed on the flood protection structures. Most of the damages that are accounted for in the DRR sector are those caused to the flood control structures of the Kelani river basin as reported by the Department of Irrigation.[117] The following are the damages to the flood control structures in both Colombo and Gampaha Districts where most of the damages occurred.

District	Damaged items	Cost/LKR
Colombo	Major flood Control gates	40,000,000
	Minor flood protection structures	15,000,000
	River bank erosion	15,000,000
Total Colombo		**70,000,000**
Gampaha	Major flood Control gates	25,000,000
	Minor flood protection structures	25,000,000
	River bank erosion	20,000,000
Total Gampaha		**70,000,000**
Total Damages		**140,000,000**

Table 84. Damages to Flood Protection Structures. Source: Department of Irrigation: Ministry of Irrigation and Water Resources of Sri Lanka.

116 *See here for an overview: http://www.readme.lk/help-flood-relief-efforts/*

117 *Refer to Irrigation chapter*

Losses

Losses were calculated based on the government's expenses related to the response activities, including costs for relief distribution, camp management and logistics expenditures, incurred by DMC, NDRSC, and the Ministry of Defense. However, calculating the cost of government staff engaged in all 24 districts during response period was not feasible within the time agreed for the PDNA, as such staff cost was not taken in accounting the loss. Additionally, funds received through insurance and contingency funds were deducted from losses, and only funds drawn over the above two sources reflected as losses.

Similarly, funds raised and received for humanitarian response through UN CERF or agencies' own emergency response mechanism (e.g. the IFRC appeal), which are meant for humanitarian response is not treated as a loss. Only funds diverted from on-going programme for response were counted as loss. A similar approach was taken to calculate losses to NGOs. However the total recorded expenditure of the UN and NGOs during the disaster is given in Annex 15. Disaster Risk Reduction including Urban Risks.

Categories	Total Cost (LKR)
Relief distribution	62,489,664
Camp management	89,363,037
Logistic expenditure for response	2,400,000
Total	**154,252,702**

Table 85. Losses to the DRR Sector-Government cost of relief operations. Source: Ministry of Disaster Management.

Agency Name	District	Sector	Total Cost (LKR)
Child Fund Sri Lanka	Puttalam	Psychosocial Support, NFI, Education & Food Security	1,869,000
Plan International Sri Lanka	Colombo	Education	17,000,000
UNFPA	Colombo, Galle, Kegalle, Jaffna, Ratnapura	WASH (hygiene items for women & girls)	425,000
World Vision Lanka	Kegalle, Colombo, Gampaha	WASH, Education, Protection, NFI, Camp Management, DRR, Shelter	69,141,253
Asia Pacific Alliance for Disaster Management Sri Lanka (private sector network)	Colombo, Gampaha, Kegalle	WASH, Food security, NFI, Health & Nutrition, Early recovery	7,612,623
WHO	All disaster affected 22 districts	Health	4,060,545
TOTAL			**100,108,421**

Table 86. Losses to UN and NGOs from Humanitarian Response (14 May-30 June 2016).[118] Source: PDNA team.

Public			Private		
Damages	Losses	Total (LKR)	Damages	Losses	Total (LKR)
140,000,000	154,252,702	294,252,702	0	100,108,421	100,108,421
Overall Total Damages (LKR)			140,000,000		
Overall Total Losses (LKR)			254,361,123		
Overall Total Damages and Losses (LKR)			394,361,123		

Table 87. DRR damages and losses.

118 See Annex 15. Disaster Risk Reduction including Urban Risks for total expenditure by UN and NGOs for disaster relief that did not constitute as losses.

Recovery and Reconstruction Strategy

Reconstruction

The first priority for reconstruction should be given to the rehabilitation and strengthening of existing flood protection structures. Some of the structures will need complete re-designing considering the current hydrological data. The protection levels of existing structures may be insufficient to ensure the safety of citizens in urban areas. Therefore, the levels of protection should be increased at least up to a 50 year return period (which is comparable to 1989 flood).

Recovery

This section reflects priorities for improved disaster risk management and reduction over the short, medium and long terms, expressed by an array of local and regional entities associated with disaster management. The DRM related issues and priorities discussed in this section can be distributed across the following five pillars: (a) risk identification and assessment; (b) strengthening and enhancing emergency preparedness; (c) institutional capacity building; (d) risk mitigation investments, and; (e) risk financing and transfer mechanisms. These five pillars are in line with the four priorities of the Sendai Framework for Disaster Risk Reduction 2015-2030.

Immediate and short term Needs

Community-based disaster preparedness and enhancing risk awareness

Communities remain the first responders to disasters. While many divisional/district preparedness plans exist, community based-disaster management also should be given priority.

Strengthening local level elements of EWS

Strengthening of the last mile dissemination of early warning for flood and other hydro-meteorological hazards will require a comprehensive effort, which will take significant amount of resources and several years of sustained engagement.

Short and medium-term needs

Strengthening institutional and legislative arrangements for disaster risk management in the affected areas taking into consideration the gaps identified in the PDNA.

Improve information management system

There is an urgent requirement to reaffirm the central role of the DMC as the disaster management information hub and strengthen the information management system and its capacity through:

- Further development of disaster information systems (e.g. desinventar) and other databases suitable to record and systematise disaster loss-related data.
- Creation of open access web based GIS system, capable in near real time, of collecting, transferring, locating and analysing data and other information concerning exposure to risk and vulnerabilities.
- Development of a methodology for gender and age disaggregated data collection, storage and dissemination.
- Development of a network of practitioners and research centres at national level, and linked to regional and international networks, in the relevant field of disaster risk management in order to ensure that decision-makers have all the relevant science and practice-based knowledge and scenarios, agreed among all relevant stakeholders, when taking decisions.

- Development of a common needs assessment framework in line with internationally developed standards and improving the capacity of relevant officials to conduct assessments.
- Using the existing Open Data initiative of the GoSL,[119] to share baseline information for assessments and recovery planning or setting up data platforms managed by MDM to facilitate data and information collection for post disaster assessments.

Improve local level Urban/Local Development Planning processes that are sensitive to flood risks

- Development of detailed local-level flood risk maps for flood prone urban areas.
- Promotion of land use planning and monitoring for both urban and rural areas.
- Carry out vulnerability assessment for the highly vulnerable communities to understand underlying disaster risk drivers such as the consequences of poverty and inequality, climate change and variability, unplanned and rapid urbanization etc.
- Research on climate change impact on human settlements with the purpose of their integration into development planning.

Improve local level Governance on Disaster Risk Management

- Promote the consultations of communities at risk in preparing development plans incorporating disaster risk reduction elements.
- Ensure disaster preparedness/contingency plans are available as an integral part of development plans at all levels.
- Actively promote community engagement to strengthen resilience to better prepare for recurrent shocks, particularly women and children's involvement.
- Ensure a proper mechanism to incorporate lessons learned of community engagement in DRR, into policy planning to bring policies closer and relevant for the people.
- Provide training programmes for volunteers and social workers in each community on disaster awareness, emergency response, camp management etc., including on adopting a child-centred approach to disaster preparedness and response.

Construction of multi-purpose safety centres

During the emergency operations, many schools were used as safety centres. While this may have saved lives at the time of the crisis, on medium term, this created interruption to the regular education activities and caused major damages to the schools. There is great need for disaster safety centres to be constructed in frequently flooded areas, and for other natural calamities. The shelters should have facilities for uninterrupted supply of water and sanitation facilities according to minimum standards. These centres should be linked to the communication network for speedy evacuation and delivery of relief supplies during disasters.

Long term Risk Reduction Needs

Support the Implementation of the long-term plan for overall disaster risk management in the country as part of its obligations to implement the Sendai Framework, Ministry of Disaster. This includes, incorporating DRR into sectoral plans, exploring the development of micro finance/insurance mechanisms and social protection schemes, allocation of sufficient financial resources for Disaster risk reduction, building capacity of responsible officials, strengthening the legal and institutional arrangements etc.

119 See here: https://www.data.gov.lk/

Recovery and Reconstruction Needs with Costs

Consolidated Framework of DRR Needs and Priorities

The matrix below provides a summary of consolidated framework of the DRR needs and priorities identified above.

DRR recovery and reconstruction needs	Short Term (LKR million)	Medium Term (LKR million)	Long Term (LKR million)	Total Cost (LKR million)
Community-based disaster preparedness and enhancing risk awareness in most vulnerable villages in Gampaha (18), Colombo (60), Kegalle and Puttalam (300) • Formation of GN/Community level disaster preparedness committees • Formation of specialised disaster management teams on various aspects of disaster preparedness • Community based risk assessment and identification of priority interventions at the community level • Provision of some basic disaster response resources. (Ropes, megaphones, life jackets, flash lights etc.) • Assess and Improve the facilities in safety centres in most vulnerable divisions in Colombo, Gampaha, Kegalle, Puttalam and Ratnapura districts • Construction of multipurpose community centres in Colombo and Gampaha districts to be used as safety centres in events of disaster		75	125	200
Strengthening local level elements of early warning systems in Kegalle, Puttalam, Colombo and Gampaha • Community based rain gauges established in 960 most vulnerable GN locations • Introduce public addressing systems to disseminate flood early warning messages (last mile dissemination) in Colombo, Gampaha, Puttalam • Developing locally appropriate protocols for communicating early warning that link with community based disaster preparedness efforts.		40	40	80
Strengthening the current Disaster Risk Management systems. • Conduct an in depth lessons learnt exercise for recent floods and landslides and identify areas to be improved • Develop guidelines for recovery planning and implementation • Build capacity of vulnerable private sector business organisations to develop business continuity planning including development of guidelines and conduct training programmes • Review excising preparedness plan for response in Gampha, Colombo, Puttalam and Kegalle districts • Develop guidelines for post flood and landslide recovery based on BBB practices • Strengthen Disaster response mechanism through the National emergency operations plan including private sector • Revitalise the National Disaster Management Coordinating Committee as the coordinating platform for DRR • Operationalisation of policy measures such as district/divisional level Preparedness Plans • Amendment of Flood Protection Act • Based on the recommendations from the review, develop policy provisions and guidelines for district and divisional plans • Capacity development for developing district and divisional level disaster management plans • Develop a policy for relocation of people living in high risk locations	4		6	10

Mainstreaming DRR in Development programmes • Develop tools and guidelines for mainstreaming DRR in to on-going development programmes in Colombo, Gampaha, Puttalam and Kegalle • Training and awareness creation in the above districts		1	4	5
Improve local level Governance on Disaster Risk Management • Develop tools and guidelines for mainstreaming DRR into local government programs • Conduct training programs to incorporate DRR into local government programs • Work with local partners to promote and support DRR initiatives.		3	2	5
Strengthening Data and information management in DRM • Develop formats/guidelines for disaggregated data collection • Conduct PDNA training programmes at national/district/GN level • Building capacity of DMC/NDRSC officials and other relevant officials on disaggregated data collection • Conduct Sensitisation programmes on Desinventar database and importance of accurate data for evidence based decision making • Establish a dedicated center for disaster information management		4	6	10
Promote insurance for the sectors not covered under the NITF • Identify the elements not covered under the NITF • Build the capacity of relevant officials on conducting damage assessment to facilitate for the insurance scheme within stipulated time • Build awareness among the public on risk transfer tools and risk insurance • Conduct dialogue with Insurance providers to promote insurance for the elements not covered under the NITF		4.5	5.5	10
Total	**4.0**	**127.5**	**188.5**	**320.0**

Table 88. DRR recovery and reconstruction needs.

Implementation Strategy for Recovery

The Ministry of Disaster Management, together with its agencies (DMC, NBRO and the NDRSC), will lead the implementation of the above consolidated framework for recovery.

Sector Assessment Methodology

Six districts severely affected by floods and landslides out of 24 were considered in this chapter for assessment of disaster impacts and in developing recovery programmes.

Data provided by NDRSC on affected districts, people and relief provided was used in the assessment. In the absence of data on number of victims in evacuation centres and impacts on informal sector, field observations were conducted in formulating recommendation. However, due to the limited time available, comprehensive community consultations could not be conducted. Recommendations were made based on the experience of public sector and UN agencies. Flood defence infrastructure maintained by the Irrigation department was assessed by this chapter; however the flood defence infrastructure maintained by the local authorities (including Provincial Councils and the Department of Agrarian Development) could not be assessed, due to data limitations.

OON MAP
key
DS Division
Periyakalappuwa Lagoon
High-Land
Lotus
Salminiya
Mud
Bridge
Main road
Mugathuwaram Sea
Mathurai Tree
River
Village Boaders
Less Fish
Paddy Field
Pottuvil Road

Employment and Livelihoods

Executive Summary

The floods and landslides affected the livelihoods of about 500,000 people in 24 districts and 258,310 people across the six most affected districts prioritised by this report. The floods destroyed shelters inundating entire villages and urban areas including areas of industrial and services activities impacting on livelihoods of those employed in agriculture, industries and micro and small enterprises. Districts such as Anuradhapura, Ratnapura, Puttalam and Kegalle have sustained huge losses to agriculture-based livelihoods while Colombo and Gampaha, which suffered most damages and losses, have a large proportion of livelihoods in the industry and services sector. About 64,550 employed people were estimated to be impacted by floods with an estimated loss of about 1.5 million working days as shown by the analysis of this chapter. The analysis also shows that the total loss to employment and livelihoods is estimated at LKR 6.78 billion with a loss of formal employment at LKR 1.72 billion and other livelihoods losses for the informal sector at LKR 5.06 billion.

Despite the heavy losses suffered, the reconstruction and recovery phase is an opportunity for job creation and employment growth. A key strategy of the recovery process should be to enable households and workers to recover their productive and income-generating activities and increasing the resilience of livelihoods to future shocks. An estimated LKR 7,840 million would be required to revive the employment and livelihoods lost due to the May 2016 disaster.

Pre-disaster Context and Baseline

Labour Market Overview

	Total	%	Male	%	Female	%
Sri Lanka	8,947,493	100.0	5,767,293	64.5	3,180,200	35.5
Urban	1,501,982	100.0	1,011,366	67.3	490,615	32.7
Rural	7,012,924	100.0	4,527,537	64.6	2,485,388	35.4
Estate	432,587	100.0	228,390	52.8	204,197	47.2

Table 89. Economically Active Population.
Source: Sri Lanka Labour Force. Survey 2015 Q4, Department of Census & Statistics.

The economically active population in Sri Lanka was estimated to be over 8.9 million in 2015, which comprised of 64.5 percent male (5.7 million) and 35.5 percent female (3.1 million). The ratio of male to female population in the urban and rural districts that are economically active is 2:1 but it is an equal ratio in the estate sector.

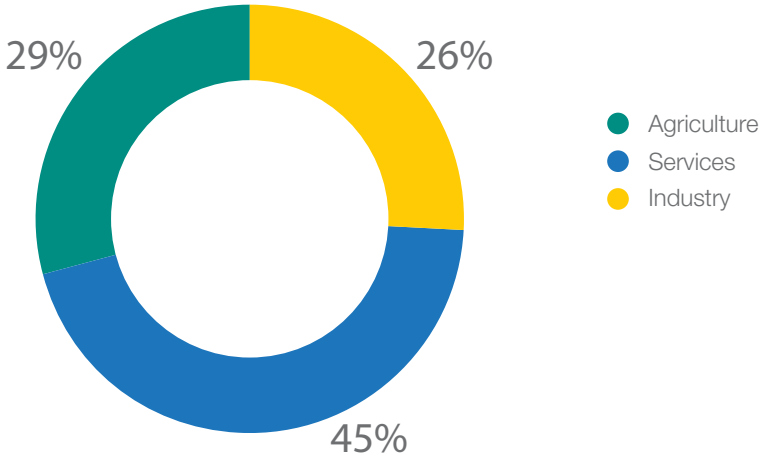


Figure 18. Distribution of employment by considering main job by major industry groups.
Source: LFS 2014, Department of Census & Statistics.

As shown in the Figure 18, nearly one third of the labour force is engaged in agriculture and 26 percent in industries while the service sector contribution is relatively high at 45 percent and is expanding.[120]

Gender	Economically Active		Economically Inactive	
	No.	%	No.	%
Total	8,804,548	100.0	7,727,220	100.0
Male	5,728,383	65.1	1,948,493	25.2
Female	3,076,165	34.9	5,778,727	74.8

Table 90. Economically Active/Inactive Population by Gender.
Source: LFS 2014, Department of Census & Statistics.

Table 89 and Table 90 show that men dominate the labour market, with statistics showing that the economically active female population is almost half the economically active male population. The number of economically inactive females is estimated at 74.8 percent while only a quarter of the males are economically inactive. While the census statistics show that almost 75 percent of women are inactive, in reality however, women are significantly engaged in the informal sector and in home based self-employment activities but this is not adequately captured and quantified in formal statistics. This also calls for better data collection and more research to this issue to draw attention to possible recognition of women's contribution to economy of Sri Lanka. More information on women's participation in the informal sector will help in addressing vulnerabilities to their livelihoods and employment.

Informal/Formal SectorTotal		Economic Sector		
		Agricultural	Non-Agricultural	
Total	No	8,423,994	2,399,629	6,024,364
	%	100.0	100.0	100.0
Formal Sector	No	3,408,544	245,994	3,162,550
	%	40.5	10.3	52.5
Informal Sector	No	5,015,450	2,153,636	2,861,814
	%	59.5	89.7	47.5

Table 91. Composition of Informal/Formal Sector Employment by Economic Sector.
Source: LFS 2014, Department of Census & Statistics.

120 *Department of Census and Statistics, 2014, Sri Lanka Labour Force Survey.*

The overall majority or nearly 60 percent of the labour force in the country is employed within the informal sector comprising of about 26 percent and 34 percent of total informal sector labour force respectively in agricultural and non-agricultural activities. The formal sector accounts for only about 40 percent, and of this a majority workforce (38 percent of total formal sector workforce) is in the non-agricultural sectors. Only less than 3 percent of total labour force is engaged in the formal agriculture activities.

This shows that informal sector contribution to the national economy is significant due to its employment generation potential. Therefore, paying adequate attention to relatively higher vulnerability of this sector to risks needs to be a national priority.

	Total		Sector			
			Formal		Informal	
Status of Employment	No.	%	No.	%	No.	%
Total	8,423,994	100.0	3,408,544	100.0	5,015,450	100.0
Employees	4,754,696	56.4	3,079,034	90.3	1,675,661	33.4
Employer	232,680	2.8	103,544	3.0	129,136	2.6
Own account worker	2,685,403	31.9	163,801	4.8	2,521,602	50.3
Contributing family worker	751,215	8.9	62,165	1.8	689,050	13.7

Table 92. Distribution of Informal/Formal sector employment by employment status. Source: LFS 2014, Department of Census & Statistics.

Table 92 shows that about half of the informal labour force in the country is own account workers or self-employed who are not attached to a particular informal enterprise. This category would include micro scale self-employed and floating working population who offer their labour for short-term opportunities. These categories are highly vulnerable to disasters and economic shocks as also the employees and contributing family workers in the informal sector.

	Employment Status				
Province	Unemployment rate	Paid Employee	Employer	Self-Employed	Contributing Family Worker
Total	4	56.0	3	32	9
Western	3.7	68.3	4	23.5	4.2
Central	4.3	57.9	2.2	30.1	9.7
Southern	5.9	55.2	3.2	33.1	8.5
Northern	5.3	60.8	2.7	33.6	2.9
Eastern	4.9	57.8	1.7	37.5	3
North Western	4	50.3	3.1	35.8	10.7
North Central	3.3	34.9	0.5	43.6	20.9
Uva	2.9	36.8	0.7	40.5	21.9
Sabaragamuwa	5.5	55.8	2.5	33.7	8.1

Table 93. Employment Status by Province-2014. Source: LFS 2014. Department of Census & Statistics.

Table 93, which shows employment status by province, indicates that paid employees in most provinces are close to national average. With the exception of North Central and Uva provinces, which include districts of Anuradhapura, Polonnaruwa, Monaragala and Badulla districts, the number of paid employees is relatively high in the other provinces and highest in the Western province which includes Colombo and Gampaha districts. The agriculture livelihoods dominated provinces such as North Central and Uva show less than national average in paid employment but have a higher proportion of family workers and self-employed people.

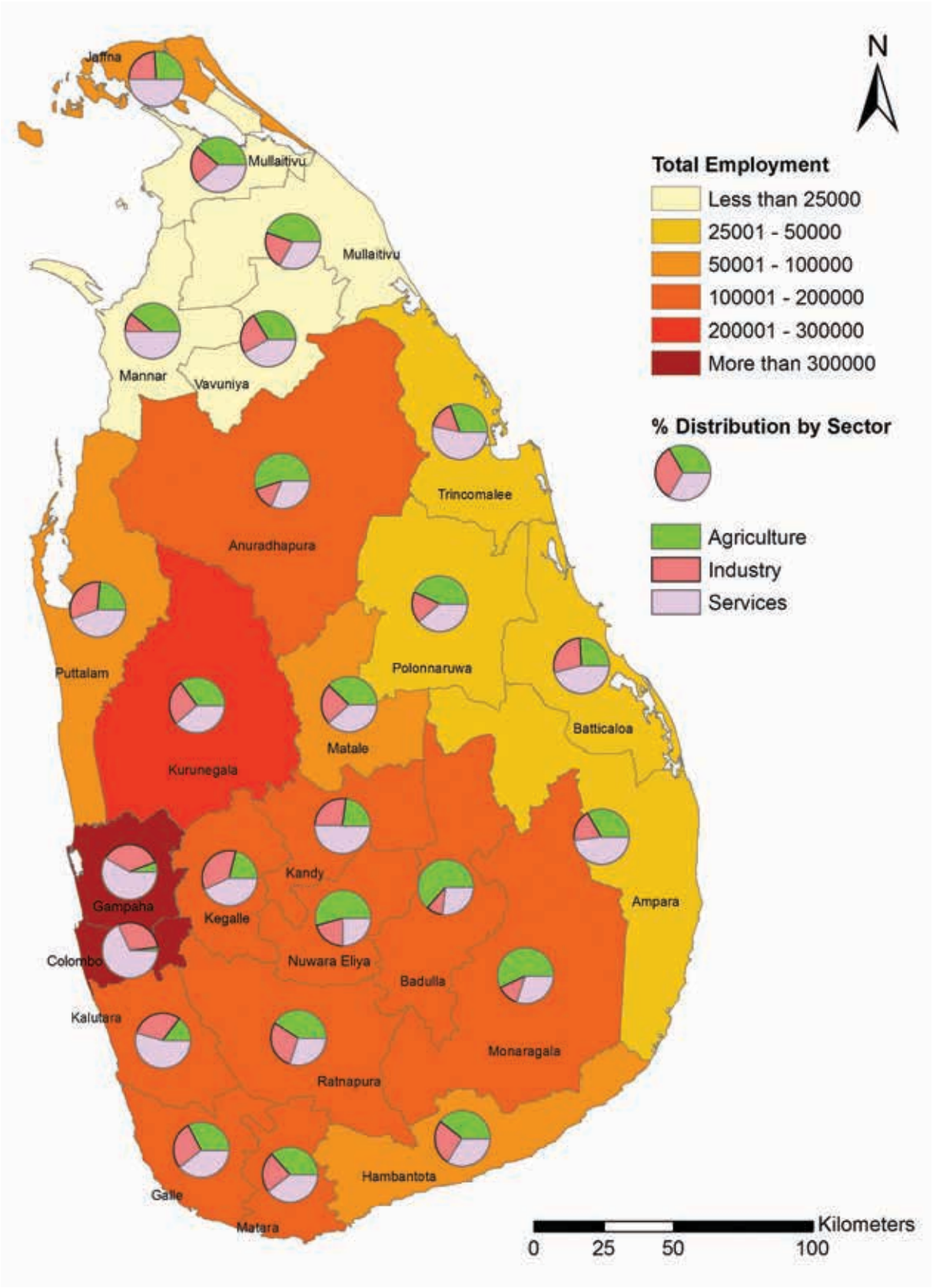


Figure 19. Percentage distribution of employed population in major industry groups by districts 2014. Source: Department of Census and Statistics.

Figure 19 indicates the distribution of employed population by the three major industry groups: agriculture, industry and services. This illustrates that the six most affected districts prioritised by the PDNA are also contributing significantly to the employed labour force in Sri Lanka across the three different major industry groups. Anuradhapura is one of the four districts which generate high agriculture related employment and the district was impacted heavily by the May 2016 floods, implying high agriculture associated damages and losses and affecting related employment. Similarly, the figure also shows that Puttalam, Gampaha and Kegalle districts which contribute most to employment generation in the industry are also amongst most affected districts, indicating high impact on industry related employment. Similarly, service industry too would have been hard hit as Colombo and Gampaha which were the most affected are also the highest contributing districts to service industry based employment in the country.

District	Major Industry Group		
	Agriculture	Industry	Service
Colombo	1.8	27.7	70.5
Gampaha	4.6	38.8	56.6
Kalutara	17	32.6	50.4
Kandy	22.7	23.4	53.9
Matale	38.1	21.8	40
Nuwara Eliya	67.1	11.9	21
Galle	30.5	26.4	43.1
Matara	33.4	25.1	41.5
Hambantota	38.9	24.4	36.7
Batticaloa	30.2	21	48.9
Ampara	45.9	8.8	45.2
Trincomalee	28.3	19.4	52.3
Jaffna	45.5	21	33.5
Mannar	35.2	21.2	43.5
Vavuniya	26.5	28.2	45.3
Mullaitivu	32.5	20.7	46.8
Kilinochchi	26.8	19.3	53.9
Kurunegala	33.2	29.3	37.6
Puttalam	26	28.6	45.3
Anuradhapura	51.5	14.3	34.2
Polonnaruwa	43.1	19.3	37.6
Badulla	57.3	12	30.7
Monaragala	53.5	12.8	33.7
Ratnapura	43.3	26.3	30.3
Kegalle	23.5	33.2	43.4

Table 94. Percentage Distribution of Employed Population by Major Industry Group for Each District.
Source: LFS, Annual Bulletin 2015, Department of Census and Statistics.

Table 94 provides information on distribution of employed population across the three major industry groups: agriculture, industry and services, in each district. Although services industry's contribution to employment in Colombo is the highest (70 percent) and shows a marked difference compared to other districts, it seems that the services industry's contribution to employment generation throughout the country is also progressing quite well; e.g. war-affected districts such as Kilinochchi, Trincomalee, Mannar etc. shows around 50 percent employment in service sector. While type and quality of services may differ, it also indicates relatively good service provision across the country, although presumably more vulnerable informal sector to providing most of it.

Similarly, Table 94 further emphasises information given in Figure 18; not only that services industry is the largest employment creator it also creates significant informal sector jobs as well as many informal sector livelihoods. The Table 91 shows that close to 50 percent of informal sector falls under Agriculture, while service sector seems to take care of most of the balance. This is assumed based on employment in services distributed across all districts given in Table 94 being consistently higher than the industry.

Natural and other crisis can easily cause disruption to service industry as shown by the disaster situation under study, even when the large majority of population in these districts are not directly affected by a crisis.

Post-disaster Effects

This chapter considers the labour force engagement in informal sector as livelihoods and formal sector as employment.

Impacts on Livelihoods (Informal sector) : Information collected by various government and other agencies, discussion with stakeholders and with affected population showed that the May 2016 disasters caused significant impact not only to micro, small and medium industry but also to the larger industrial sector as clearly mentioned in the Industry and Commerce Chapter. The amount of damage to home based, micro and small industries is not clear due to lack of data but from field visits and the extent of housing damage, it is very clear that a large number of people lost their livelihood.

Agriculture related livelihoods losses : Agriculture livelihood related activities is also relevant to many of the 24 affected districts. Agriculture livelihood is important in Anuradhapura out of six most affected districts is it is a major rice producing district, although agriculture is an important livelihood in Ratnapura, Puttalm and Kegalle too. About 26,000 ha of agricultural lands including paddy, fruit and vegetable and other field crops were reported to be damaged due to the disaster. About 34,309 agricultural workers across the country were affected and loss was LKR 99 million.[121]

Losses in Kegalle Districts : Special attention needs to be paid to losses and damages to agriculture livelihoods due to landslides in the Kegalle District. In Aranayake Division of the District, 733 individuals were assessed as affected while it was observed that half of them were self-employed in agriculture sector, about 25 percent in private sector and the rest in daily wage categories. Only a small percentage of people had secondary sources of income through remittances from family members. Average income of a household remained at LKR 15,000 to LKR 20,000 range.[122] As a result of the disaster and displacement, an estimated loss of 65,970 work-days and personal income loss of LKR 46.17 million was recorded for a period of three months following the disaster. There will be relocation arrangements for these people by the government in future and this process will require introduction of new and alternative livelihood options and supporting skills.

Informal Sector losses : Although actual post disaster data is lacking in general, the impacts of the disaster could be drawn up based on discussions with stakeholders and affected communities and by analysing labour force statistics of the country. Data given above shows that about 28 percent of the employed population in Western province, 42 percent of Sabaragamuwa province and 46.5 percent in North Western province are either self-employed or contributing family workers (Table 93). As majority (60 percent) of them fall under informal sector (Table 92) and as mentioned above are amongst higher vulnerable to disasters. This group can even be larger than 60 percent because according to national classification a business enterprise can fall into the formal sector category if it fulfils one of the following criteria; be

121 *Refer to "Agriculture Labour" in the Post-disaster effects section of the "Food Security, Agriculture, Livestock, Fisheries" chapter*

122 *Sri Lanka Red Cross Society, Post Disaster Needs Assessment, Kegalle District*

registered with GoSL, pay EPF/ETF or provide employment opportunities for 10 persons. As such, it is safe to assume that a significant portion of enterprise that fall under formal sector[123] carried out by DCS used for this chapter, would still be micro and small industries quite vulnerable to risks. Micro and small-scale vulnerable businesses were mostly not registered and do not have their own insurance coverage, as shown by PDNA discussions with affected and stakeholders. PDNA related discussions with affected communities on ground showed that there are businesses which ran in rented premises; in this case, while the owner of the premises would be entitled to insurance for the damage of house, the unregistered business would not be given any compensation.

Table 95 shows the number of people in the informal sector across the three major industry categories. The number of people employed in the informal sector for each category of work is calculated based on the assumption that the national average for people employed in the informal sector is 60 percent (Table 90) and it is consistently distributed across districts. The following table presents the number of people engaged in informal employment across the three major industry groups of employment.

District	Major Industry Group			Total
	Agriculture	Industry	Service	
Colombo	10.49	161.48	410.98	582.95
Gampaha	26.58	224.19	327.03	577.80
Puttalam	50.42	55.46	87.84	193.72
Kegalle	49.66	70.16	91.72	211.55
Ratnapura	119.78	72.75	83.82	276.35
Anuradhapura	112.88	31.34	74.96	219.19

Table 95. Distribution of informal sector employment across major industry groups in priority districts (Thousands of persons).

The Informal sector is spread throughout the country, but a large portion of this is in Colombo and Gampaha districts, which are the two most affected districts. In the six priority districts, the total number of people in the informal sector is about 2,061,600 persons. Table 96 shows the number of persons engaged in the informal sector affected by the May 2016 flood, which was derived based on the number of people in the informal sector by district by major industry group and percentage of people affected in each district. The number of informal sector people affected in the six priority districts is about 99,027. It was also assumed that the number of affected people was equally distributed in the three major industry groups.

District	Major Industry Group			Total
	Agriculture	Industry	Service	
Colombo	1,011	15,561	39,605	56,177
Gampaha	836	7,048	10,281	18,164
Puttalam	2,737	3,010	4,768	10,515
Kegalle	2,009	2,839	3,711	8,558
Ratnapura	1,929	1,172	1,350	4,452
Anuradhapura	598	166	397	1,161
Total	**9,120**	**29,796**	**60,112**	**99,027**

Table 96. Number of people in informal sector employment affected by the disaster in priority districts.[124]

123 *As per quarterly Labour Force Survey (quarter 4) 2015*

124 *Percentages of affected in Colombo and Gampaha districts are from the Annex 10. Industry and Commerce Chapter, percentage affected in other districts are assumptions made comparing data from Colombo and Gampaha*

The informal sector ranges very widely, from three wheeler taxi drivers; to retail outlets of varying size; to food processing; tailoring; barber salons; beauty parlours; handicrafts; home gardening etc. Losses to informal sector could be observed as total destruction or damages to property where business was housed, loss and damages to equipment, stocks that were lost and loss of working capital that got channelled to other priorities. Most small businesses, which did not operate from their own premises, would not, as mentioned above, get government support to restore business premises. Per business unit damage could be comparatively low but large number of enterprises that fall under this category would not recover from damages incurred to their capital equipment investment, often obtained through loans or hire-purchasing schemes.[125] This type of disasters would not only result in big losses for small enterprises but also make them go out of business. An example are the trishaw drivers who often drive rented trishaws to earn their daily wage and are not recognised by risk sharing/transfer schemes. The number of trishaw drivers affected was estimated to be about 1,750. Number of workdays lost is approximately 12,250 and personal income of about LKR 12.25 million.[126]

Small businesses could become extremely indebted and pushed towards worse conditions of poverty. Thriving of high interest informal sector loan schemes as captured through discussions held with affected communities and local stakeholders in the six priority districts under the PDNA supports this assumption. Large portion of micro and small business would have gone out of business due to the disaster.

There are large numbers of women engaged in informal sector affected by the disaster, as further evidenced by discussions and feedback sessions carried out during the PDNA. It is unfortunate, however, that the significant silent contribution the women make towards the national and local economy is not duly recognised. As a result, it is more difficult for a woman in informal sector to recover from disaster due to her inability to apply for post disaster assistance and support to restart livelihood activities.

Lack of data is a serious challenge to assess effects and impacts on this very important sector. Therefore, the analysis impacts of this sector are estimated based on national statistics and proxies. Affected persons by employment status and district can be drawn based on the percentage distribution of persons engaged in the informal sector by employment status and number of affected people in the major industry groups. Table 97 shows the affected persons engaged in the informal sector by Employment Status and District.

	Agriculture			Industry			Service		
District	SE	E	CFW	SE	E	CFW	SE	E	CFW
Colombo	278	691	42	4279	10628	654	10891	27050	1663
Gampaha	230	571	35	1938	4814	296	2827	7022	432
Puttalam	1065	1377	293	1171	1514	322	1855	2398	510
Kegalle	727	1121	163	1028	1584	230	1343	2071	301
Ratnapura	698	1077	156	424	654	95	489	753	109
Anuradhapura	264	209	125	73	58	35	175	139	83

Table 97. Distribution of affected persons in informal sector by Employment Status and District.

SE-Self Employed, E-Paid Employee, CFW-Contributing Family Worker

In the informal sector assessment in the Industry and Commerce chapter suggest that the informal sector is more severely affected and it has estimated approximately three months of business interruption due to

125 *A hire purchase is a popular method of business financing including for small businesses, promoted by financing institutions to buy goods through making instalment payments over time.*

126 *Muslim Aid Sri Lanka, Post Disaster Assessment Colombo, Gampaha & Kegalle 2016.*

the May 2016 disasters. This was substantiated by the community consultations done in late July in flood-affected areas of Colombo and Gampaha. It has been revealed that most of the informal businesses had not resumed operation even by July. Therefore, three months of income losses have been considered in the informal sector. The mean monthly income of Own-account workers in Urban (i.e. Colombo and Gampaha districts) was considered as LKR 23,833, while in all other cases, mean monthly gross salary in agriculture sector is considered as LKR 15,911, in industry as LKR 21,064, and in service as LKR 26,229.[127]

Accordingly, the total estimated loss to livelihoods in the six priority districts therefore is LKR 5,057 million as shown in the Table below.

District	Agriculture			Industry			Service			Grand Total
	SE	E	CFW	SE	E	CFW	SE	E	CFW	
Colombo	19,882	25,293	1,469	261,463	522,787	30,369	665,455	1,400,570	81,361	3,008,649
Gampaha	14,039	20,900	1,214	118,419	236,775	13,755	172,745	363,572	21,120	962,538
Puttalam	33,894	50,556	10,130	50,076	74,694	14,967	83,490	124,535	24,954	467,296
Kegalle	23,425	40,525	5,630	44,450	76,898	10,684	61,164	105,812	14,701	383,290
Ratnapura	22,495	38,916	5,407	18,352	31,748	4,411	22,255	38,501	5,349	187,433
Anuradhapura	9,017	7,321	4,322	3,363	2,730	1,612	8,466	6,874	4,058	47,763
Total										**5,056,969**

Table 98. Loss of employment of Informal Sector Employment by Employment Status and District (LKR thousand).

SE-Self Employed, E-Paid Employee, F-Contributing Family Worker

Impact on Employment

There are over 3 million employees in the formal sector. The number of self-employed in Sri Lanka is around 2.6 million.[128] Of them 52.5 percent[129] are employed in non-agricultural livelihoods. However, analysis for the purpose of this chapter was based on national statistics and proxies based on information from other chapters or stakeholder discussions.

As mentioned in the Industry and Commerce Chapter there are 679,495 industries and the 6 districts prioritised by the PDNA account for 41 percent of the total industry. Therefore, the effect and impacts on employment is quite high as confirmed by the Industry and Commerce Chapter. Insurance claim data presented in the Industry and Commerce Chapter suggests that damages and losses occurred to large to medium scale businesses amounts to over LKR 25 billion.

While larger industry and service sector is a small percentage of the overall industry, they provide higher contribution to the GDP/national economy. Most major industry and services are situated mostly in western province and the other most affected districts (see Figure 19). Disruption of work of large and medium scale industry has direct implications on employment. The Industry and Commerce chapter shows that even the large industry and service sector did not have effective DM/emergency plans nor business continuity plans which in turn have serious implications on livelihoods of informal workers and businesses and employment security of wage earners that is essential to effective industry and service major industry businesses.

The number of people employed in the Biyagama Export Processing Zone was 21,862 attached to 60 commercial establishments.[130] The field visit of PDNA team in the end of July 2016 to Biyagama revealed

127 *Source: Department of Census and Statistics, 2014*

128 *Department of Census and Statistics, 2014, Sri Lanka Labour Force Survey 2014.*

129 *ibid*

130 *Board of Investment of Sri Lanka, 2013, Annual Report 2013.*

that a number of companies continued to be closed due to severe damage to the infrastructure, storage and production inputs. Even though a full account of employment losses are not yet available, initial fact finding missions anticipate significant losses in the formal sector too.

According to the Labour Force survey of 2014, the total number of people employed in the formal sector is 3,408,544 (see Table 91), which is 40 percent of the total number of people employed in the both formal and informal sectors. The exact number of people in formal employment for each of the six affected districts was not available across all major sectors, therefore, the national average of 40 percent was applied across the six districts to arrive at the number of people employed and district wise percentage of affected people was used to assume the number of people affected in the formal sector. The table below presents the total number of employed population across the major sectors and people affected in the same sectors.

District	Agriculture		Industry		Service		Total Affected
	Employed	Affected	Employed	Affected	Employed	Affected	
Colombo	6.84	0.66	105.26	10.14	267.90	25.82	36.62
Gampaha	17.33	0.54	146.14	4.59	213.18	6.70	11.84
Puttalam	32.86	1.78	36.15	1.96	57.26	3.11	6.85
Kegalle	32.37	1.31	45.74	1.85	59.79	2.42	5.58
Ratnapura	78.08	1.26	47.42	0.76	54.64	0.88	2.90
Anuradhapura	73.58	0.39	20.43	0.11	48.86	0.26	0.76
Total	**241.06**	**5.94**	**401.14**	**19.42**	**701.63**	**39.18**	**64.55**

Table 99. Employed and Affected Population in Formal Sectors by Major Industry Group in Priority Districts-2014 (thousands of persons).

According to the Industry and Commerce assessment, some of the major companies will be out of business for more than six months. However, assuming that majority (75%) of the formal sector enterprise resumed operation within two weeks and the balance within three months of the disaster, this assessment considered two weeks of employment income losses of 75 percent of the employees in the formal sector and three months income losses of the remaining employees. Other employment types while suffered similar or more losses most likely would not have got compensated. Mean monthly gross salary estimated in the Labour Force Survey of DCS in 2014 by major industry type was used to calculate the losses (i.e. In Agriculture sector 15,911, in Industry 21,064, and in Service 26,229).

Assuming that 75 percent of the paid employees work in large and medium size companies that resumed work in two weeks and the balance lost their income for three months due to relocating and other forms of recovery strategies used by affected businesses, the total loss of income is LKR 1,722 million.

District	Losses in Formal Sector (LKR Thousands)			Total
	Agriculture	Industry	Service	
Colombo	11,798.68	240,372.01	761,787.99	1,013,958.67
Gampaha	9,749.38	108,866.54	197,751.60	316,367.51
Puttalam	31,930.68	46,499.07	91,710.14	170,139.89
Kegalle	23,443.84	43,847.25	71,373.15	138,664.23
Ratnapura	22,512.84	18,102.62	25,969.84	66,585.29
Anuradhapura	6,975.04	2,564.00	7,635.71	17,174.76
Total	**106,410.46**	**460,251.48**	**1,156,228.42**	**1,722,890.36**

Table 100 Loss of income of formal Sector Employment by District (LKR thousand).

Cross-cutting Issues

Livelihood and employment issues can be considered as cross cutting, all productive and social sectors have livelihood implications and create employment. Any negative impact on these sectors would have negative implications on livelihoods and employment dynamics of the country.

As mentioned above formal and informal sector needs strong technical inputs from DRR and environment 'sectors' to develop disaster risk reduction plans and risk based planning of businesses, as well as business continuity planning. Universities, Technical Colleges and other relevant institutions should start working on specific skills development and be able to provide technical inputs and backstopping for the industry as the industry starts developing and implementing these plans.

Low and inadequate recognition by national statistics of women's contribution to livelihoods and employment and in turn to the national economy is a serious concern as mentioned above. Many programmes including government and CSO facilitated initiatives would support women's active engagement at informal and local levels. Women are also key employment industries such as manufacturing, retail businesses etc. not to mention their contribution as domestic workers including outside the country. Therefore, this is a gap that needs immediate serious attention as it has implications on how recovery planning, long term resilience building planning is designed and implemented.

Recovery and Reconstruction Strategy

Recommendations

- Ensure that Ministries of Disaster Management, Industries and Commerce and National Policy and Economic Affairs set up a system to collect post disaster data related to industry linking Department of Census and Statistics, Chambers of Industries and universities. This should be a priority in the recovery programme in the short-medium term
- Informal sector in Sri Lanka is the major contributor to national employment and given its extreme importance for national economy adequate attention should be paid to carry out better analysis of its vulnerability and devise interventions to reduce vulnerability in the medium to long term
- Similarly, role of women in the formal and informal employment as well as livelihoods must be studied and build on existing studies and research. This should be done on priority basis on the short-medium term, it seems that due to lack of recognition women engaged in livelihoods and employment would miss getting much deserved support from recovery programmes. It would also push women further towards poverty and increased vulnerability for future disasters. Ministry of Women's Affairs together with DCS should re-examine and update data collection formats to better reflect realities in livelihoods and employment in the country
- The analysis also should include better understanding of the expanding service industry which supports livelihoods and create informal sector employment for large numbers across country including rural areas. It is important to understand specific risks and vulnerabilities of the service industry to safeguard livelihoods and employment for large numbers. Better understanding of type of support needed for service industry must be carried out during short term with a view to revive the industry to ensure revival of livelihoods and employment in the medium long term
- Mandate industries to develop and implement a disaster risk reduction plan (short-medium term), which includes emergency operational plans that also contain safety of employees as well as business continuity plans that safeguard employment. Ministry of Industries and Commerce, and Chambers of Industries can facilitate this by creating policy environment and providing technical support necessary for this to happen. It is extremely important that this process includes micro and medium scale industries, which has specific issues to focus on, supported by local government and regional chambers

- Ensure emergency employment generation and labour intensive programmes to provide quick employment opportunities and short-term income generation, specifically for large numbers of people who lost employment as well as those who are struggling to revive lost livelihoods. This could be created through labour intensive and flood/climate resilient interventions in reconstruction process in flood and landslide affected areas
- Monitor and provide support for recovery of large and medium scale industries which would help restore access to markets to revive supply chains and to stabilise the local economy as it would help revival of small and micro enterprises
- Develop partnerships with CSO to facilitate
    - Provision of soft loans/zero collateral loans to enable micro entrepreneurs and smallholder households, including women to replenish their assets and to re-start their livelihoods
    - Support banking and micro credit sectors to extend their services to micro enterprises including capacity building on risk sharing and transfer options such as better saving practices and prescribing for insurance for emergency situations
    - Support insurance sector to extend their services to informal businesses at household levels to join available insurance schemes or create special schemes suitable for informal sector micro enterprises
    - To revisit current social security and protection schemes so that vulnerable/affected households are provided with support until they are able to earn adequate income

Recovery and Reconstruction Needs with Costs

Recovery Needs	Short-term (2016) Emergency Employment Programme	Medium-term (2017) Support to Revive Livelihoods and Employment	Long-term (2018-2020) Build Resilient Livelihoods and Employment
Informal Sector Livelihoods (total affected)	4,348		
Agriculture sector livelihoods		150	300
Provision of new and alternative livelihoods support to the affected in Kegalle		367	73
Self employed		2,312	
Employees	290		
Total Needs (LKR million)	**4,638**	**2,829**	**373**

Table 101. Employment and Livelihoods recovery and reconstruction needs.

Recovery needs given in Table 101 is estimated based on the following:

1. About 99,027 total affected persons engaged in informal livelihoods in the six priority districts need some form of emergency alternative employment which bring them minimum average LKR 14,637[131] per month for 3 months
2. Affected self-employed in agriculture sector (3,002) persons need an average LKR 50,000 per affected person to revive agriculture livelihoods and estimated to need at least LKR 100,000 per person in the long run to build resilient recovery
3. In addition, the 733 families affected by landslides needs to relocate their agriculture livelihoods. It is expected that this would happen in medium term at an estimated cost of LKR 500,000 per affected family and would need another LKR 100,000 per person in the long run

131 *Mean monthly wage of daily earners. Source: Labour Force Survey, 2014*

4. 23,124 self-employed persons in non-agricultural livelihoods would need LKR 100,000 to revive their livelihoods in resilient manner
5. It is assumed that 10 percent of the 64,550 employees in the formal sector will lose their job completely due to relocating and other forms of recovery strategies used by affected businesses. In the short and medium term these employees need some form of minimum support which is estimated to be at least LKR 15,000 per person per month for three months. In the long run the total employed population should be brought under the insurance cover to move towards resilient employment

The above estimation shows that total recovery needs would be about LKR 5.117 billion.

Implementation Strategy for Recovery

Recovery strategies in the three major industry groups would take place quite differently and differences would also be expected based on whether an industry is in formal or informal sector. Recovery strategies would be based on recommendations given in Industry and Commerce and Agriculture, Fisheries and Livestock chapters. It is important as mentioned above these strategies should as much as possible be engaging labour force; labour intensive and skills improving for labour force so that not only will it provide much needed short term employment for the sector but also incorporate "build back better" or resilience building aspects.

Sector Assessment Methodology

Methodology and Assumptions

According to the PDNA Volume B guidelines (Employment, Livelihood & Social Protection), the analysis of the disaster effect on employment and livelihoods sector was based upon a cross-cutting analysis and as such relying on the disaster effect data gathered by other PDNA sectors, in particular the productive sectors agriculture & livestock and industry and trade.

Quarterly labour force survey reports (quarter 4, 2015) published by the Department of Census and Statistics and Annual Report of the Central Bank of Sri Lanka (2015) were used as key secondary sources to establish the baseline on labour and employment trends. The data on the effects of the disaster was mainly derived from the accumulated source from the National Disaster Relief Services Centre attached to the Ministry of Disaster Management. Further data were obtained from other sector reports.

There are serious gaps and lack of reliable and detailed data on post disaster situation related to livelihoods and employment across all major industry groups. Therefore, analysis of post disaster situation is based on assumptions made through qualitative and anecdotal feedback received during data gathering by the PDNA team against baseline situation presented above. A reliable set of information on the effects of the floods and landslides in the weeks following the disaster was difficult to construct due to data limitations in multiple economic sectors. These data limitations could only provide partial estimates of labour earnings and work days lost. However, qualitative information gathered from the field and non-representative surveys conducted by various agencies engaged in relief and recovery activities allowed us to outline the affected labour earnings and work days.

Limitations

Non-farm household based and microenterprises in the industry and commerce sector represent an important segment of urban economy in Sri Lanka. Estimation of losses and damages in the informal sector due to the floods and landslide was not immediately available. The District Secretariats of the disaster-hit districts have conducted detailed assessment of the losses in the informal livelihood sectors. However, the results are yet to be released. Inadequate information makes estimating damages and losses to micro and small industry particularly challenging. The Industry and Commerce chapter had to rely heavily on information on insurance payments to industry as proxy to estimate damage and loss. As micro and small enterprises are not insured and most of the enterprises not even registered to be entitled to any form of formal assistance, it is safe to assume that information in Industry and Commerce chapter does not include damages to micro and small enterprises and businesses. Therefore, while there is more than ample qualitative evidence to support heavy losses to assets of micro/small enterprises as a fact, there is total lack of quantitative details of same.

Gender and Social Inclusion

Executive Summary

Socially rooted inequalities and discrimination against certain social groups — including women, children, the elderly, disabled and other ethnic and religious-based minorities — are decisive factors when disasters hit in determining who survives and recovers or lags behind. In most cases, vulnerable groups unfortunately become more disadvantaged. Such factors also determine the level of participation and degree of benefit certain groups will receive from post-disaster recovery processes and their general resilience to future disasters.

While the lack of sex and age disaggregated data collection in pre and post-disaster context severely hindered the impact analysis of the floods and landslides from gender and other social inclusion perspectives, the assessment found that women, particularly FHHs, of which 33.6 percent are elderly widows, were the most significantly affected population of the disaster in the six most affected districts within the key sectors of housing, agriculture, employment and livelihoods, water and sanitation and health.

Women's lower employment status and higher dependence on agriculture and the informal sector have resulted in the disaster severely compromising their ability to generate and provide income and food security for their households. The informality and invisibility of their economic activities also means that a large proportion of women workers are unable to benefit from government compensation schemes meant for Small and Medium Enterprises (SMEs)[132] that have been affected by the disaster. Additionally, as women's livelihoods are often home-based and most of their time is spent within their immediate environment,[133] the loss of their homes compounds the hardships. Vulnerable women's adversity is further exacerbated by social barriers against property and land ownership, limited access to financial resources and assets, all of which are central to recovery.[134]

It is further complicated to categorise the difficulties experienced by women, as they do not form a homogenous group in Sri Lanka. Due to the society's diverse ethnicities and religions, women from minor ethnic or religious groups have been proved to be more vulnerable[135] and their hardships mostly overlooked in disaster situation. The 30-year war has also created a predominantly disadvantaged group of FHHs, comprising 24.2 percent of the total households in the country.

Moreover, the disaster had a negative impact on children's access to education in the immediate aftermath of the disaster. Lack of disaggregated age data and insufficient understanding and sensitivity towards the principles of child protection in the field posed risks of overlooking the recovery needs for children, especially young girls.

Despite their traumatic experience, psychosocial well-being of vulnerable groups was not prioritised and these groups were detached from the relief and recovery process. Such elimination added more stress, anxiety and fear for the unknown and helpless future.

With an increasing proportion of female population, the national government has put stronger emphasis on gender equality in recent years. The assessment recommends such emphasis should be extended

132 Department of Census and Statistics and Ministry of Women's Affairs, 2014, The Sri Lankan Women: Partner in Progress.

133 ADB, 2015, Country Gender Assessment Sri Lanka: An Update.

134 Herath, H.M.A, 2015, Place of Women in Sri Lankan Society: Measures for Their Empowerment for Development and Good Governance.

135 Law & Society Trust, 2011, Truth Telling, Gender and Commissions of Inquiry in Sri Lanka.

to the post-disaster recovery process and be used as an opportunity to redress social inequality issues that make women and other social groups more vulnerable to disaster impacts. For critical understanding of social impacts of future disasters and effective development of appropriate recovery strategies, it is further recommended that the mechanisms for collection, use, sharing and management of sex and age disaggregated data be prioritised within the national DRR mechanisms, National Statistics Office and the national gender machinery.

Pre-disaster Context and Baseline

According to the 2015 Human Development Report, Sri Lanka ranks high on the gender equality index, at 78 out of 188 countries the highest in South Asia.[136] It is one of the few countries in Asia that has a sex ratio of 93.7 (males per 100 women) and women constitute 51.6 percent of the population. The average female life expectancy is 79.6 years, which is more than the average male life expectancy of 72.4 years.[137] The country also has one of the best performing indicators in literacy,[138] with a steadily declining gender gap in literacy rate from 25 percentage points in 1953 to 3 percentage points in 2010.[139]

Free primary, secondary and tertiary education, as well as equal access to an extensive network of state schools, has made a significant contribution to the attainment of high female literacy rates, high levels of primary school enrolment and gender parity in overall educational attainment. Universal access to education has had a noticeable impact on the attainment of gender equity in general education. For instance, the proportion of the population that has completed secondary education for both sexes in 2009/2010 show similar trends. The 12,526 female students enrolled in the local universities represent 58 percent of the total university admissions for the academic year 2009/2010.[140]

Despite progress in access to education, Sri Lanka presents a mixed picture on promoting gender equality. Sri Lanka is comprised of diverse ethnic and religious groups, which potentially marginalises ethnic/religious minority women into "minorities of minorities," as they face compounded issues of discrimination as female ethnic/religious minorities.[141] Moreover, Sri Lanka's unique position as a post-conflict country has resulted in a large number of FHHs, especially in the Northeast regions. According to the Household Income and Expenditure Survey, 24.2 percent of all households in Sri Lanka are female headed, with the majority in the age group of 40-59 years.[142] The survey also indicates that more than 50 percent of FHHs are widows and 4 percent have never married.

Six Main Affected Districts	Total Population	Number of Households	Number of FHHs	% of FHHs Per District
Colombo	2,324,349	562,550	135,878	24.15
Gampaha	2,304,833	598,674	139,212	23.25
Anuradhapura	860,575	229,032	60,730	26.51
Puttalam	762,396	201,364	50,141	24.90
Kegalle	840,648	219,404	57,980	26.42
Ratnapura	1,088,007	284,282	57,441	20.20
Total	**8,180,808**	**2,095,184**	**501,381**	**23.93**

Table 102. Number of FHHs per District in Sri Lanka. Source: DMC/NDRSC.

136 *UNDP, 2015, Human Development Report 2015.*

137 *ADB, 2015, Country Gender Assessment Sri Lanka: An Update.*

138 *Female literacy rates, which stood at 55.5% in 1953, recorded substantial progress to reach 90.8% in 2010.*

139 *Source: Ministry Report, 2014*

140 *Source: Gender Report-Ministry of Women and Children's Affairs*

141 *demographic/ethnicity/religion*

142 *Department of Census and Statistics, 2013, Household Income and Expenditure Survey 2012/13.*

Women also continue to lag behind in terms of employment and political representation. Unemployment amongst women is more than twice the unemployment rate of men, and women comprise only 34.7 percent of the Sri Lankan labour force, compared to 74.6 percent among males.[143] Additionally, the majority of women who participate in the labour force do so in the informal sector. Although the sector provides flexibility to engage in cash economy while taking care of household work, it leaves them vulnerable to exploitation and abuse during their course of employment, especially in plantations.[144] Moreover, women largely engage in unpaid domestic work and household chores, where women do 80 percent of unpaid work, compared to 20 percent done by men.[145]

While women in Sri Lanka continue to be held behind in the workforce within the country, Sri Lanka is a notable country of origin for female migrant domestic workers, especially to the Gulf Cooperation Council countries. In fact, domestic workers provide a large proportion of the remittances the Sri Lankan government receives.[146]

In regard to political representation, despite women having exercised their voting rights since1931, political participation is ranked much lower than neighbouring countries in Asia and the Pacific, as national representation is only at 5.8 percent and the rate is even lower at the provincial and local levels.[147]

Proportionally, nutritional status is also low among women and children. According to the Medical Research Institute, 23.5 percent of children aged 6-59 months are underweight.[148] In addition, 9.8 percent of pregnant mothers (among those who attend antenatal clinics) are anaemic while 22 percent of non-pregnant women suffer from anaemia.[149]

While Sri Lanka lacks systematic and national level collection of statistics on gender-based violence (GBV), information from service providers, such as police and non-governmental organisations, indicate significant prevalence of various forms of GBV across the country[150]. A UNOPS study (2011) found that 51.2 percent of respondents indicated prevalence of domestic violence[151].

143 *Department of Census and Statistics, 2016, Sri Lanka Labour Force Survey.*

144 *Inter Press Service, 2015, Sri Lanka's Development Goals Fall Short on Gender Equality.*

145 *Ariyarathna, T., et al, 2014, The vulnerability of women in the economy.*

146 *Jayasuriya, Rasika and Opeskin, Brian, 2015, The Migration of Women Domestic Workers from Sri Lanka: Protecting the Rights of Children Left Behind.*

147 *Asian Development Bank, 2015, Country Gender Assessment Sri Lanka: An Update.*

148 *Source: Family Health Bureau, 2013*

149 *Ibid.*

150 *Ministry of Women and Child Affairs, 2014, Report of the opposition's commission on the prevention of violence against women and the girl child.*

151 *Jayasundere, Ramani, 2009, Understanding Gendered Violence against Women in Sri Lanka.*

Post-disaster Effects

The floods and landslides affected in total almost 500,000, including 221,478 women and girls. Of the total affected population, around 24,832 were children under the age of 18. A total of 93 people died, 117 are reported missing and 33 were injured. The breakdown of the deceased people is as follows: 36 women, 43 men, 10 children, 4 bodies could not be identified.

There was no disaggregated data available for injuries and casualties in the period of the writing of this report.

While gender analysis generally reports that natural disasters increase female mortality more than male mortality,[152] there was a higher male mortality for the floods. The deaths from landslides, however, tell a different story. In all of the disaster-affected districts, statistics reflect that more men died than women, except in Kegalle, where most of the deaths occurred from landslides.

Further investigation on deaths and injuries is required to fully understand the underlying causes of mortality rate among men for this particular disaster, as they could have implications on how men and women perceive disaster risks differently, as well as how Sri Lanka raises awareness on risks and communicates early warning information.

Age analysis was not possible as age disaggregated data has not been collected. However, it has been reported that in total, 10 children were killed during the landslide disaster and floods. Four children lost both their parents and seven lost their fathers, who, in most cases, were the breadwinners of the family, indicating seven new FHHs. Currently, all four orphan children are in welfare centres with other families. The Probation department has decided to transfer them to children's home in Nuwara Eliya in the near future.

Disaster Impact

While quantitative data is limited, qualitative assessments suggested that women, compared to men, are disadvantaged by facing a greater burden from the floods and landslides in the six most affected districts. Gender discrimination can confine women and girls to set gender roles, limit their participation in economic activities and cripple their voice in development and disaster response. Such factors create vulnerabilities for women to disasters and hinder their capacity to recover quickly.

Where there was a dependence of women on agriculture and home-based economies, the only opportunity that those women had to basic production resources (farm land and home gardens)[153] was lost due to floods/landslides. The loss of these crops and food stocks made it difficult for women to achieve food security, which would decrease family nutrition levels.

As such, the loss of houses and household assets in combination with imposed reproductive roles and social restrictions on mobility (potentially within certain ethnic groups) severely limited coping strategies and their engagement in economic activities, at a time when they need income the most.

152 Neumayer, Eric and Plümper, Thomas, 2007, The gendered nature of natural disasters: the impact of catastrophic events on the gender gap in life expectancy, 1981-2002.

153 Disaggregated national labour force statistics reveal that women workers are concentrated in the following occupational categories: Skilled agricultural and fisheries workers (24.5%); Elementary occupations (22.7%); Craft and related workers (15.8%); Professionals (10.4%) (teaching and nursing professions, in particular); Feminization of Poverty in Sri Lanka, 2015.

Productive Sectors

Limited disaggregated data on women's share in the agriculture, trade and commerce sectors makes it difficult to analyse the effects of disaster from a gender perspective. Available data highlights that only 34.7 percent women are part of the labour force.[154] Evidence also shows that fewer women are employed and most of them are paid less for the same amount of work and heavily dependent on subsistence economies, making them poorer.[155] Furthermore, women are often employed as unpaid workers, especially in the agriculture sector. As agriculture plots are mostly registered under the male household member's name, women's work often goes unrecognised and undocumented. For rural women, the loss of food stocks, agriculture livelihoods, homes and home base livelihoods, while being primarily responsible to providing food security and nutrition for their families, could place an enormous strain on the overall well-being of the household and their economic advancement. As there was no immediate or substantial impact on the prices of commodities, which would have caused a sudden inflation in prices, food security itself has not been a major issue in Sri Lanka during the disaster. This can also be attributed to generous food rations provided by religious communities, governmental aid and civil society assistance. Nevertheless, the quality of food grains has been raised as a concern, as nutritional value has been called into question by authorities in relief agencies.[156]

This disaster also largely affected the urban area, where women mostly work in the informal sector as undocumented workers. Although unreported, these women would have been heavily affected but remain invisible. The majority of the poor women in urban areas derive their livelihoods from the informal sector. The low capital entry requirement and the informality of the sector give women the flexibility to engage in economic activities while taking on reproductive and caring responsibilities. Examples of low-skilled labour activities are beedi (local cigarette) rolling, basket weaving and dress-making etc.

It should also be noted that urban areas, including Colombo, have the highest number of people living in poverty—usually the bottom 40 percent of the overall socio-economic strata. Although female labour force is higher than most South Asian countries, it is lower than comparable middle-income countries. This is compounded by the fact that they have fewer coping strategies than their male counterparts.

An important concern is that women who make up the bulk of the informal sector will not be able to benefit from the compensation schemes targeting SMEs. The estate sector is a good example, as it employs the highest proportion of women working in unskilled labour. This sector performs poorly on most human development indicators, as the provision of basic services is left to the estate and unregulated. As such, women and men affected by the disaster could be facing exclusion challenges in access to humanitarian needs as well as government recovery programmes. For example, it was noted that women in Free Trade Zones were affected by the disasters and asset losses but were unable to gain access to public aid as their loss was considered as direct responsibility of the company. In Kegalle, the closure of one tea company has left women with no tea plucking jobs and owners of small-scale tea farms with no compensation.

Social norms related to women's reproductive and unpaid care roles generally have a negative impact on women's ability to quickly recover from the disaster impact. This may be an even a higher concern for FHHs without spousal support. The World Bank Report notes that 66 percent of women did not participate in the labour market due to 'household activities.'[157] While balancing unpaid care work as well as paid work in non-disaster situations is challenging enough; in post-disaster situations, this presents far greater difficulty.

154 Source: Ministry of Women and Children's Affairs

155 Kottegoda, S., 2004, Gender Dimensions of Poverty in Sri Lanka. CEPA Briefing Papers , Vol.08

156 Source: NGO Field work (Kegalle)-Red Cross.

157 Vodopivec, Milan & Arunatilake, Nisha, 2008, The Impact of Population Aging on the Labour Market: The Case of Sri Lanka.

Except for those living in evacuation camps, most women experienced an increase in emergency-related work, such as cleaning, replanting, taking care of kids who are out of school and fetching clean water etc.

Infrastructure

The impact of the floods and landslides on infrastructure and gender equality is less clear. The impact on irrigation systems has the potential to reduce agricultural productivity, which can have a bearing on women's ability to secure food for their households. However, lack of concrete data on the relationship between gender equality and other social inclusion issues and irrigation systems is not available, which makes the analysis challenging.

Water and sanitation related infrastructure was noted as an urgent issue for women and children. Multiple interviewees asserted that washroom facilities in welfare centres and transitional camps required improvement in design (i.e. higher and thicker space dividers) and the necessity for more space to ensure greater protection and privacy.

A common problem highlighted across all communities during interviews was that the evacuation centres and shelters did not have adequate WASH facilities, with some admitting to using the bushes as toilets during the displacement. While there are no reported cases, lack of access to sanitation can put women and girls at risk to sexual violence while they resort to using bushes, especially at night.

Social Sectors

Housing represents shelter for women and young girls from potential violence, and some of the affected population must stay at camps and shelters until the end of housing construction. While there is no data on violence against women in the affected areas, women in Kegalle reported that they fear for their children, as displacement means they have no home and must live with unfamiliar people. Experience from the region also shows that lack of privacy in shelters and crowded living arrangements with extended family and friends can lead to heightened risk of violence and exploitation of women and girls. It is also important to highlight that FHHs, the elderly, widows/widowers and people living with disabilities have been affected the most. As they are some of the most impoverished, their homes are often poorly constructed or maintained, thus more likely to have sustained extensive damage. Lack of physical strength and/or financial resources leave these households with severe challenges in rebuilding their homes.

As noted above, the loss of home and shelter, particularly in Kegalle, has had a higher impact on women due to the fact that women's livelihoods are home-based while men's activities tend to be based away from homes. A house is a vehicle for economic livelihoods for most women in Sri Lanka. Consequently, destruction of houses, kitchens and other household assets have different consequences for women and men. Interviews with women in Kegalle indicated that the loss of a house is equivalent to the loss of household economies. Most women in the region (i.e., Elangapitiya) were engaged in the private sector with activities like wrapping cigarettes at home, while a few were engaged in cloth making. These livelihoods were discontinued due to the loss of homes along with household equipment and tools for deriving livelihoods.

Low rate of property ownership by women is another problem. While the 1978 Constitution guarantees fundamental rights and non-discrimination on grounds of sex, and Sri Lanka has a provision for special measures to ensure women's rights to equality, discrimination against women in the inheritance schedules in the Land Development Ordinance (1935),[158] which gives preference to male inheritance, has not been removed.

158 Source: Land Development Ordinance, 1935.

Moreover, mothers living in transitional camps reported difficulties finding appropriate transportation to take their children to school and other classes located in their former villages. In some cases, the distance between the camp and their former village means that children have to take several buses to get to school or have to walk in the dark through unfamiliar areas. This poses protection risks, particularly for young girls.

Malnutrition surveillance among children under five and pregnant mothers may be critical in the coming months, especially for those who continue to depend on food rations and have not yet been resettled and provided farm land.

Summary of Damages and Losses

District Name	Total Population	Number of Female	Number of Male	Number of Affected People
Colombo	2,324,349	1,183,877	1,140,472	228,871
Gampaha	2,304,833	1,187,940	1,116,893	74,003
Puttalam	762,396	393,425	368,971	42,881
Anuradhapura	860,575	440,475	420,100	4,729
Ratnapura	1,088,007	551,606	536,401	18,154
Kegalle	840,648	439,828	400,820	34,833
Other District Total	12,178,631	6,305,654	5,872,977	89,848
Total	**20,359,439**	**10,502,805**	**9,856,634**	**439,319**

Table 103. Sex-disaggregated data for disaster-affected population in six districts.

Given the difficulty of obtaining disaggregated data, it was necessary to restrict the data requests to the priority districts.

Impact Analysis on Development Goals

Monitoring the progress on achieving SDGs in the affected districts will be key in ensuring that the affected masses do not fall and become trapped under the poverty line. While it is difficult to quantitatively determine the overall impact of this disaster on the overall performance of the SDGs from a gender perspective, the recurrence of disasters and shock in Sri Lanka has the potential to undermine the achievement of goal on Poverty Eradication. Interviews with the affected communities indicated that they experience floods or droughts almost on a yearly basis. The 2014 World Development Report[159] states that disasters play a major role in pushing households below the poverty line and keeping them there, and evidence from Haiti, Pakistan and the Philippines has shown clearly that disasters can lead to an abrupt, systemic, intergenerational and long-lasting increase in poverty. For example, poverty levels in the Rizal Province in the Philippines nearly doubled due to Typhoons Ondoy and Pepeng; and continue to be elevated three years later.[160] More frequently, smaller events are likely to remain unrecorded, thus become obstacles to drawing adequate policy responses. The frequency of disasters erodes the long-term resilience of the poorest population. This disaster and consequent future disasters would have negative impact on lifting women, who make the majority of the poorest in Sri Lanka, out of poverty. This situation could be even more dire for FHH and elderly widows who often have unstable sources of income and limited social support.

159 *The World Bank, 2013, World Development Report: Risk and Opportunity—Management Risk for Development.*

160 *Oxfam International, Christian Aid, WSPA, Islamic Relief, Plan International UK and Global Network for Disaster Reduction, 2014, Policy Brief: Disasters in the SDGs—A first Response to the Focus Areas proposed by the Co-Chairs.*

The impact of disasters on poverty also has a direct relationship with the impact on achieving gender equality and women's empowerment under Goal 5 of the SDGs. The recognition that disasters have a disproportionate impact on women and girls, as already highlighted in this report, is critical to generating appropriate response. Women who already own few assets have lost most, and they will have to work harder than their male counterparts to provide adequate food, nutrition and other household necessities for themselves and their families. Under increasing time poverty in post-disaster situation, women will inevitably struggle the most to recover to pre-disaster level.

While there was only a short disruption to the education systems for most districts, interrupted education did delay returning to normalcy for children, particularly for those whose schools were significantly damaged or buildings were used to house displaced persons. 103,178 children who are presently out of primary school due to the disaster are more likely to be from the estate sector than rural or urban areas, and are as likely to be girls or boys from poorer families.[161] Due to high burden of work and the high cost on families as a result of the disaster, more children—particularly girls—from lower income quintiles drop out of schools to support alternative livelihoods. In this context, Goal 4, Quality Education, has been negatively affected in both short and long term.

Overall, it is difficult to state the exact nature and extent of the disaster impact to development goals in Sri Lanka, as the time frame of the actual disaster was relatively short. However, it is feasible, that though the impact of this disaster on the macro-economy was small (see Macro-economic Impact), the funds and resources put forward by the government towards disaster recovery may disrupt other scheduled activities or programmes set forth for development goals.

Protection Issues

Gender Based Violence (GBV) : The absence of sex and age disaggregated data and gender analysis during the conduct of disaster impact assessments limits the understanding of protection issues that women and children may have to face or continue to face as a result of the disaster. This is further compounded by the lack of pre-disaster baseline data.

GBV is one extreme form of exclusion. Experience shows that violence against women increased in past post-disaster situations and during the conflict.[162] While incidence of violence against women and children has not been documented as part of disaster impact assessments, interviews with men and women in evacuation centres show that parents are worried for the safety of their children. This was documented in Elangapitiya, where men have been reluctant to leave their children behind at evacuation camps in order to look for work. Interviews with men in Kegalle indicated that they are frustrated because of not being able to provide for their families. In extreme situations, secondary data has shown that this frustration (i.e., being unable to fulfil the traditional role of the bread-winner for the family) has been a contributing factor in GBV between spouses.[163]

Furthermore, women and girls living in camps and with relatives may also face a heightened risk of violence. The 2016 floods were short term where people were largely displaced for less than two weeks. However, consultation with the Civil Society indicated that most evacuation camps and shelters are not designed to prevent GBV. Lack of segregated sleeping arrangements and bathing facilities for women and girls create new risks for women and girls in prolonged displacement. This is particularly a concern with respect to the frequency of floods experienced in the country.

161 Source: UNICEF, Post-Disaster Field Mission Report, August 2016.

162 World Bank, 2015, Sri Lanka: Ending poverty and promoting shared prosperity-a systematic country diagnostic.

163 IFRC, 2015, Unseen, unheard: Gender-based violence in disasters Global study. Geneva.

Child Protection : As in the case with sex-disaggregated data, the analysis of disaster impact on children is also quite limited, which poses the risk of overlooking the recovery needs of children. There is an obvious need to strengthen the capacities of the Disaster Management Centre and relevant local authorities for child-related data collection and building sensitivity towards the principles of child protection. It was noted by Save the Children that there was a general lack of familiarity and understanding of child protection principles among relief workers and camp management committees who worked in close proximity with displaced children, especially young girls who may have been in a vulnerable situation and at a heightened position for exploitation.

Lack of segregated sleeping quarters for females and males in most evacuation camps also necessitates a relook at camp management in general. This issue also links to the fact that schools often serve as evacuation camps which are not designed to uphold the protection of children and women. These issues necessitate the need to review and improve camp and shelter management standards through addressing gender concerns, training of relief workers and camp management committees. Most importantly, it is essential to find alternative grounds for evacuation camps in emergencies other than school buildings so impact on children's education and its quality could be minimised.

It was also evident that during the emergency more focus was given to the physical needs of community members, including food and shelter arrangement, while the psycho-social well-being of children was not prioritised. In Kegalle, parents noted that in the first two weeks, most children were having nightmares, were clinging to their parents and were afraid to be left alone. It was noted at the time of the assessment that they were frightened of loud noises, which they associated, with the exploding sound of the landslide. Very few organisations, such as Save the Children, Child Fund and UNICEF are engaged in activities that focused on the psychological well-being of the affected children. Children also reported feeling disengaged from the relief and recovery process and fearful of the unknown future ahead. It was also evident from discussions with affected children that they have not been involved in any efforts related to disaster risk reduction either at the community level or in schools as part of school safety planning.

The Elderly : The elderly, particularly elderly women, who form the majority of those beyond the age of 60, are also likely to have been disproportionally affected by the disaster. It is noted above that while a quarter of the damaged houses belong to FHHs, more than 33.6 percent of these households belong to elderly widows.[164] Elderly women lack the physical strength and are poorer with limited financial resources for rebuilding their homes. The impact of the disaster therefore makes them more economically dependent on others and pushes them further into poverty. It was also noted during interviews with the affected communities that some households were unable to act on early warning information and evacuate due to the presence of an elderly and/or disabled member within the household. Furthermore, lack of accessibility of the evacuation centres by people living with disabilities (PLWD) and the elderly created challenges and potentially exposed such groups to greater risks.

Disability Issues : Lack of disability data makes it difficult to assess the Sri Lankan population that is living with some form of disability: the latest data comes from partial census conducted in 2001. It is even harder to estimate the number of PLWD who have been affected by the disaster. In any community, PLWD are likely to be among the poorest and the most vulnerable. The 2001 census noted that 31.7 percent of the disabled population in Sri Lanka did not attend school.[165] The National Policy on Disability further notes that employment rates for those with intellectual disability and epilepsy were 1 percent and 5 percent respectively.[166]

164 Siddhisena, K. A. P., 2003, Marital disruption in Sri Lanka: Trends and differentials.

165 Department of Census and Statistics, 2001, Brief Analysis of Characteristics of the Disabled Persons.

166 Source: Ministry of Social Welfare 2003: National Policy for Disability for Sri Lanka 2003

Disasters often make the situation worse for PLWD, with regard to access to information and essential services. PLWD may not be able to receive or understand early warning information. In some cases, PLWD are not able to respond to early warning information due to lack of mobility. This was especially noted in Puttalam, where some households with elderly people, who have become disabled due to old age, were not able to evacuate. It was noted that in evacuation centres, disabled people were not able to access toilets and other essential facilities. It was also noted that 33 people were injured by the floods and landslides. Physiotherapy services and psycho-social support for those recovering from such injuries were needed. Efforts should therefore be made to reach out to affected PLWDs, especially the differently abled women who are unable to gain access to medical services in the event of injuries. Disasters can also lead to a loss of caretakers, often females, or increase the burden on caretakers. Efforts to identify, document and support PLWDs in post-disaster situations, as well as provide relief to people who have become disabled as a consequence of the disaster, through social benefit schemes are essential. This support should include connecting those with debilitating injuries to the disability community for social support.

Recovery and Reconstruction Strategy

As a cross-cutting issue, the impact of the disaster from a gender perspective is considered in all the social, productive and infrastructure sectors of this report from the point of view of the line Ministries responsible or central to those sectors. The issues identified by these agencies are dealt with in the respective sector chapters.

However, post-disaster recovery resources must strive to safeguard, restore and promote the economic engagement and participation of women, especially those belonging to disadvantaged groups. Recovery efforts must not only ensure the participation of the most affected and vulnerable, but also seek to redress inequalities that make women, girls and other social groups disproportionately vulnerable to disasters.

As such, the following recommendations and strategies have been identified to address the overall impact of the disaster from a gender and social perspective:

1. Paucity of sex, age, and diversity disaggregated data, as well as lack of in-depth gender analysis in the initial stages of the assessment, severely hindered the understanding of how different gender, age and other diverse groups were affected by the flood, including their specific needs for recovery and long-term resilience. It is recommended that systems be put in place for harmonising impact assessment forms to collect unified sex and age disaggregated data and to strengthen capacities in undertaking gender analysis from collected data. Such analysis can prepare DRR strategies, including early warning systems etc., to better cater toward the needs of both men and women
2. Measures to support tenure rights will be essential to ensure recovery does not reinforce inequality faced by women and vulnerable groups. Recovery strategies in agriculture, employment and livelihoods and housing should improve women's access to and control over resources and assets, such as land, water, credit, housing reconstruction programmes and skills training etc.
3. During the aftermath of the 30-year war and the 2004 tsunami, the government and donor agencies had given humanitarian assistance and deeds to resettlement houses to men, with little consideration for traditional gender roles or customary practices of the specific region. Such insensitivity not only disrupted Sri Lanka's matrilocal system, where women should hold the rights to land, but also put women in harm's way because they became even more dependent on men. As such, joint ownership of both spouses should be enforced for new houses under construction to ensure that housing recovery efforts do not reinforce gender inequality in access to land

4. Both women and men must participate in and benefit from housing reconstruction programmes. Targeted training in masonry and building skills for women to support the home construction process could also assist women to be better represented in the labour force and to augment their livelihoods
5. Due to existing gender inequality, women and girls are likely to be excluded from recovery strategy planning, rebuilding and reconstruction programmes, thereby worsening their disadvantaged position. Thus, recognition should be made not just on the disproportionate disaster impact on women and girls, but also on women and girls' significant capacity and potential to participate in the recovery process. Such acknowledgement should be a guiding principle for future recovery, DRR and long-term development
6. Women's economic recovery must be protected and accorded the same status and importance as that of men. Targeted investment through extension, soft loans and skills development must be made in sectors with high representation of women, particularly in the informal sector in urban areas, the estate sector, agriculture, markets and SMEs. Childcare support schemes to enable women to participate and benefit from recovery programmes must be an integral part of recovery strategies for all sectors
7. The implementation of the strategies 4, 5 and 6 would have immediate and positive impacts on the livelihoods of women, which are pre-dominantly informal and homebased, addressing directly some of the key underlying livelihood issues
8. The lack of disaster impact data on gender, children, PLWD and pregnant women etc also necessitates the need for surveillance on child protection/welfare issues, malnutrition levels after the cessation of food distribution, gender based violence and violence against women and children. In addition to surveillance, a review of the effectiveness of referral mechanisms for violence during emergencies should be installed
9. Include provision on psychosocial support to disaster affected people, especially to vulnerable groups including women, children, elderly and disabled
10. Invest in disaster preparedness and recovery mechanisms, including a child-centred approach in disaster risk reduction, at the community level and review disaster preparedness mechanisms at schools to offer preparedness, protection and undisrupted education to children in disaster contexts

Recovery and Reconstruction Needs with Costs

Gender and social inclusion needs related to specific sectors are discussed in detail within each respective sector chapter.

Table 104 below provides a summary of short-term gender and social inclusion recovery needs identified by the Ministry of Women and Chilren's Affairs, amounting to LKR 32 million.

Estimated Short-Term Needs (2016)	Unit Cost (LKR million)	Total (LKR million)
Review and strengthen of referral systems for GBV and violence against children	0.25	5.00
Monitoring, response, and prevention of GBV and violence against children in affected district	2.00	10.00
Provision and strengthening of psychosocial support for children	2.00	10.00
Support to the Elderly, PLWD and child protection	0.025	5.00
Post-disaster recovery monitoring and evaluation for child and gender compliance	0.20	2.00
Total		**32**

Table 104. Gender and Social Inclusion recovery needs.

Implementation Strategy for Recovery

The implementation of gender and social inclusion needs identified within the various other sector chapters fall within the purview of the respective line ministries, however the Ministry of Women and Children's Affairs will continue to advocate the prioritisation of the above-mentioned issues, and engage in policy shifts for greater gender equality.

The Ministry of Women and Child Affairs will also be the central implementing agent for short-term recovery strategies outlined in Table 104, based on the following initiatives:

1. Disaggregated data collection on supplies to be distributed among disaster affected women and children based on gender, age, health condition, urgency and intensity of needs.
2. Psychosocial and counselling services for disaster affected women and distribution of basic relief items, such as food, medicine and sanitary items, through the Divisional Secretariat.
3. Programmes for special protection measures with the National Child Protection Authority, Women's Bureau, Department of Probation and Child Care Services, along with UN agencies and NGOs, to prevent child abuse, violation of children's rights and GBV in IDP (Internally Displaced Persons) camps by establishing special monitoring units.

Further strategies have been discussed with the Ministry of Disaster Management and the Disaster Management Centre to maintain sex and age disaggregated data for the disaster in May 2016, as well as to establish an effective disaggregated data collection mechanism for future disasters.

Realising the importance of gender and child-based interventions, the Ministry of Women and Children Affairs plans to include Disaster Management Programmes in the 2017 Annual Action Plan in order to create a safer environment for women and children in disaster situation.

Sector Assessment Methodology

This chapter utilised both primary and secondary data sources, in particular Sri Lankan Women: Partner in Progress by the Department of Census and Ministry of Women Affairs (2014); Human Development Report: Work for Human Development and Human Development Index 2015; Census on Population and Housing 2012; and the Global Gender Gap Report 2015.

Primary data were collected through the following means:

1. Rapid needs assessment in June 2016 at welfare camps in Kegalle district with the support of UNICEF, World Vision Si Lanka, Sri Lanka Red Cross and Save the Children.
2. Rapid assessment questionnaire jointly developed by Government (Probation and officers from the Department of Social Services) and UNICEF; questionnaire specifically for gender assessment was developed by UN Women, which was used in focus groups discussions and interviews.
3. Field visits in July 2016 for focus group discussion and interviews with the Divisional Secretariats in the following areas: 2 IDP camps in Aranayake, Kegalle; 1 rural village in Anuradhapura; and 1 rural village in Wanthawilluwa, Puttalam.
4. Civil society consultations with lead child protection agencies, including Save the Children, World Vision, Child Fund, Plan International and Leads, to discuss possible long-term impacts on gender and child protection in affected areas.

Assessment of Disaster Impact

Macro-economic Impact

Executive Summary

The economic impact of the floods and landslides, as measured by damage to physical assets and losses in production flows, is estimated at LKR 105 billion, equal to 0.94 percent of 2015 GDP. Total losses are estimated at LKR 18 billion or 0.16 percent of GDP and damages LKR 87 billion or 0.78 percent of GDP.[167]

The productive sector-food security, agriculture, livestock, fisheries, trade and industries—accounted for most of the losses equivalent to LKR 11 billion or 0.098 percent of 2015 GDP. However, the May 2016 floods and landslide disasters had limited impact on the GDP.

The lack of necessary data meant that it was not possible to quantify the impact of the disaster on inflation, although it is expected that the disaster would have had an impact on inflation, particularly given the damages and losses estimated in the agriculture sector. While it was expected that the disaster would lead to a drop in exports, the latest export data does not show a significant impact. On the capital account side, having declared a national disaster, the Government requested a US$100 million disbursement from the World Bank's Catastrophe Development Policy Loan with Deferred Drawdown.

While the direct impact of the disaster on fiscal revenue is expected to be small, increased current and capital expenditure in the affected sectors due to the disaster is expected to a lead to a slightly wider fiscal deficit by 0.08 percent of GDP in 2016. The increase in the projected fiscal deficit could lead to a slightly higher level of public debt of 75.9 percent of GDP by end-2016, instead of 75.8 percent of GDP.

Pre-disaster Context and Baseline

Growth amounted to 4.8 percent in 2015, while year-on-year growth in the first quarter of 2016 was 5.5 percent. Downward price revisions in key consumer items, including energy; low commodity prices in the global market; and overall improved domestic supply conditions eased inflationary pressures. As a result, average annual inflation remained benign, at 0.9 percent, in December 2015.

The 2015 external current account improved slightly in 2015 thanks to increase in tourism inflows, despite a surge of non-oil imports, almost offsetting the low commodity price windfall in 2015, weak global demand and marginally declining remittances from the Middle Eastern countries. Lower-than-expected FDI inflows and capital outflows from the government securities market and scheduled external debt obligations contributed to heightened exchange rate pressures. Despite higher-than-budgeted foreign borrowings and swap arrangements with regional facilities, the official reserves declined from the equivalent of 4.3 months of imports of goods and services in end-2014, to 3.8 months of imports of goods and services by end-2015, mainly due to continued sales of foreign currency. The LKR depreciated 10 percent against the US$ during the year.

167 All references will be to nominal GDP at market prices in 2015.

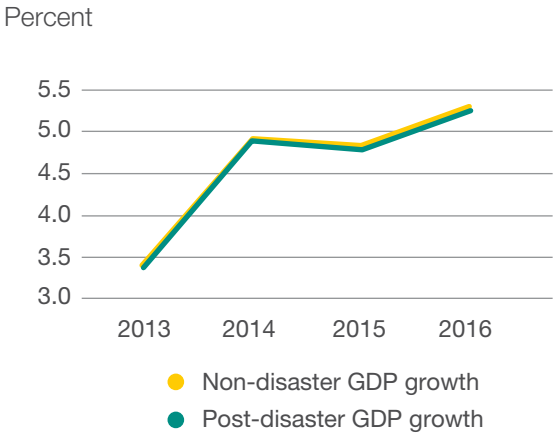


Figure 20: Pre and post-disaster GDP growth rate projections.

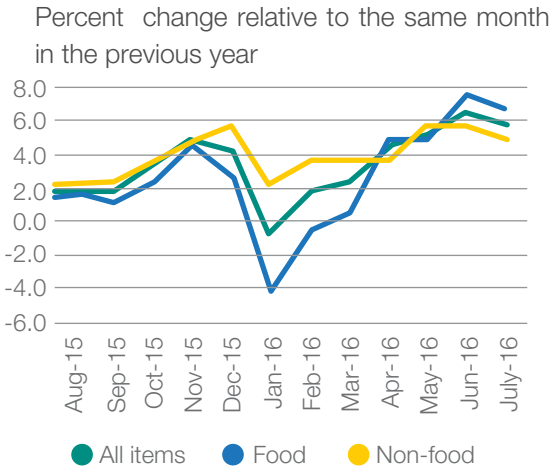


Figure 21: Inflation (all items, food and non-food).

Source: Department of Census and Statistics and PDNA team

Post-disaster Effects

The economic impact of the floods and landslides, as measured by damage to physical assets and losses in production flows, is estimated at LKR 104.9 billion, equal to 0.94 percent of the 2015 GDP. Total losses are estimated at LKR 17.9 billion or 0.16 percent of GDP and damages LKR 87.0 billion or 0.78 percent of GDP. Damage and losses were reported in 24 out of 25 districts in Sri Lanka, but they were concentrated in six districts.

Table 105 below provides an overview of the damages and losses in key sectors of the economy.

Sector	Total Damage	Total Loss	Total Effect	Private Effect	Public Effect	Public Damage	Public Loss
Social Sectors	56,826	473	57,299	55,834	1,465	507	471
Housing, Land and Settlements	55,822	256	56,078	55,822	256	0	256
Health and Nutrition	479	119	597	-	597	0(a)	119
Education	526	98	624	12	611	507	96
Productive Sectors	23,594	10,972	34,565	33,249	1,316	1,316	0
Food Security, Agriculture, Livestock, Fisheries	1,698	1,902	3,600	2,284	1,316	1,316	0
Industry and Commerce	21,895	9,070	30,966	30,966	-	0	0
Infrastructure Sectors	6,441	574	7,015	424	6,591	6,094	497
Irrigation	1,723	0	1,723	-	1,723	1,723	0
Water and Sanitation	367	77	443	424	19	19	0
Transport	4,143	44	4,187	-	4,187	4,144	43
Power Supply	208	454	662	-	662	208	454
Cross Cutting Issues	167	5,851	6,019	5,154	864	167	697
Environment	27	543	570	-	570	27	543
Disaster Risk Reduction	140	254	394	100	294	140	154
Employment & Livelihoods	0	5,054	5,054	5,054	-	0	0
Gender and Social Inclusion	0	0	0	-	-	0	0
Total	**87,028**	**17,870**	**104,898**	**94,662**	**10,236**	**8,085**	**1,665**

(a)The LKR 479 million damage in the health and nutrition sector belongs to public sector, but the entire amount is insured, so the fiscal impact is estimated to be zero

Table 105. Damage and losses by sector and by private versus public sector in LKR million. Source: PDNA team.

As can be seen from Table 105, the Housing sector suffered the highest damage, followed by the Industry and Commerce sector.

From the insurance claims data and data gathered from the informal sector (Table 106), it can be seen that the damage and losses in the "Industry and Commerce" sector were concentrated in the Western Province, and amounted to LKR 21.7 billion (mainly Colombo and Gampaha districts). Damages and losses in the "Food Security, Agriculture, Livestock, Fisheries" sector were concentrated in the Northern, Eastern, North Western and North Central provinces.

Relative to provincial GDP, the damage and loss were the highest in the Western Province (0.50 percent), followed by Sabaragamuwa (0.16 percent) and Northern (0.15 percent).

		Food Security, Agriculture, Livestock, Fisheries		Industry and Commerce		Total		
	GDP (2014 Value	Damage	Loss	Damage	Loss	Damage	Loss	Damage and loss (% of provincial GDP)
Western	4,346,682	0	31	13,608	8,091	13,608	8,122	0.50
Central	1,089,048	1	67	0	0	1	67	0.01
Southern	1,136,458	7	23	0	0	7	23	0.00
Northern	374,403	102	445	0	0	102	445	0.15
Eastern	622,759	48	292	0	0	48	292	0.05
North Western	1,122,258	56	195	430	420	486	616	0.10
North Central	535,476	67	396	65	52	132	448	0.11
Uva	521,699	11	64	0	0	11	64	0.01
Sabaragamuwa	699,695	1	72	565	478	566	550	0.16
Mahaweli zones		16	40	0	0	16	40	
Districts not known		73	276	7,170	13	7,170	13	
Other districts		0	0	57	15	57	15	
Total	**10,448,478**	**382**	**1,902**	**21,895**	**9,070**	**22,204**	**10,696**	**0.317**

Note: All values in LKR million unless otherwise indicated. Damages and Losses shown from the "Food Security, Agriculture, Livestock, Fisheries" sector represent the damages and losses in the private sector only, therefore it is reported without damages to the irrigation infrastructure (public assets) discussed within it.

Table 106. Damage and losses by district in Industry and Commerce sector. Source: PDNA team.

Impact on GDP

Losses (between May and August) were highest in the food and beverages sub-sector (LKR 5.910 billion) and the whole-sale and retail sub-sectors (LKR 55 million). The former was mainly due to flooding at two large beverages companies, which then had to halt production. The latter is mainly accounted for by losses of export products stored in warehouses in the Kelani River valley.

Using the Guidelines on the Macroeconomic Impact of Disasters of the PDNA methodology,[168] the estimated production losses of LKR 7,939 million were used to estimate the impact on projected sectoral GDP growth in 2016. As official sector-specific growth projections were not available at the time of the assessment, the team used the macroeconomic projections published by the World Bank.[169] The estimate of the impact of

168 *Explained in the Sector Assessment Methodology of this chapter*

169 *South Asia Economic Focus, April 2016, available at https://openknowledge.worldbank.org/handle/10986/24016*

the losses is fairly insensitive to the projections, as they are several orders of magnitude smaller than the sector sizes.

The direct impact of the disaster on GDP is estimated to be LKR 7.012 million, which would lead to a downward adjustment of real GDP growth by 0.051 percentage points compared to the pre-disaster situation. The impact is mainly on the manufacturing of food, beverages and tobacco products sector, equal to LKR 4,967 million, leading to a downward adjustment of real value added growth of 0.459 percentage points. This is followed by the agriculture, forestry and fishing sector, where the impact of estimated at LKR 1,947 million, leading to a downward adjustment of growth by 0.207 percentage points. The impact on growth in the remaining sectors is estimated to be negligible. The main reason for the estimated small impact is the fact that the losses in the sectors, in order of billions of LKR, are much smaller than the pre-disaster size of these sectors, which are in the order of trillions of LKR.

National accounts sector	Losses (LKR mn)	Pre-disaster value added (VA) 2016 (LKR mn)	Post-disaster value added 2016 (LKR mn)	Disaster impact on sector value added (LKR mn)	Disaster impact (% of sector VA)
Agriculture, Forestry and Fishing	1,902	988,384	986,437	-1,947	-0.207
Manufacture of food, beverages & Tobacco products	5,910	1,138,241	1,133,274	-4,967	-0.459
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting material	15	33,701	33,691	-11	0.033
Construction	40	852,808	852,783	-25	0.003
Wholesale and retail trade	55	1,365,524	1,365,466	-58	0.004
Accommodation, Food and beverage service activities	3	188,231	188,228	-2	0.001
Telecommunication	1	64,149	64,148	0	0.000
Financial Service activities, except insurance and pension funding and auxiliary financial services	3	424,548	424,547	-2	0.000
Other activities	11			0	
Total	**7,940**	**5,055,586**	**5,048,574**	**-7,012**	**-0.051**

Notes: This is based on data obtained from insurance claims. Losses by economic sector were not available the informal firms and SMEs. Projections of 2016 value added by sector were not available at the time of the PDNA data collection effort. The 2016 projection quoted in this table are World Bank's pre-disaster projections. It should be noted that the order of magnitude of the loss is well below that of the sector size, irrespective of the growth projections.

Table 107. Estimated impact of value added in industrial and sectors. Sources: PDNA team and Department of Census and Statistics.

This only assesses the direct impact of the disaster, and does not take into account the impact of remedial measures, for which data was lacking.

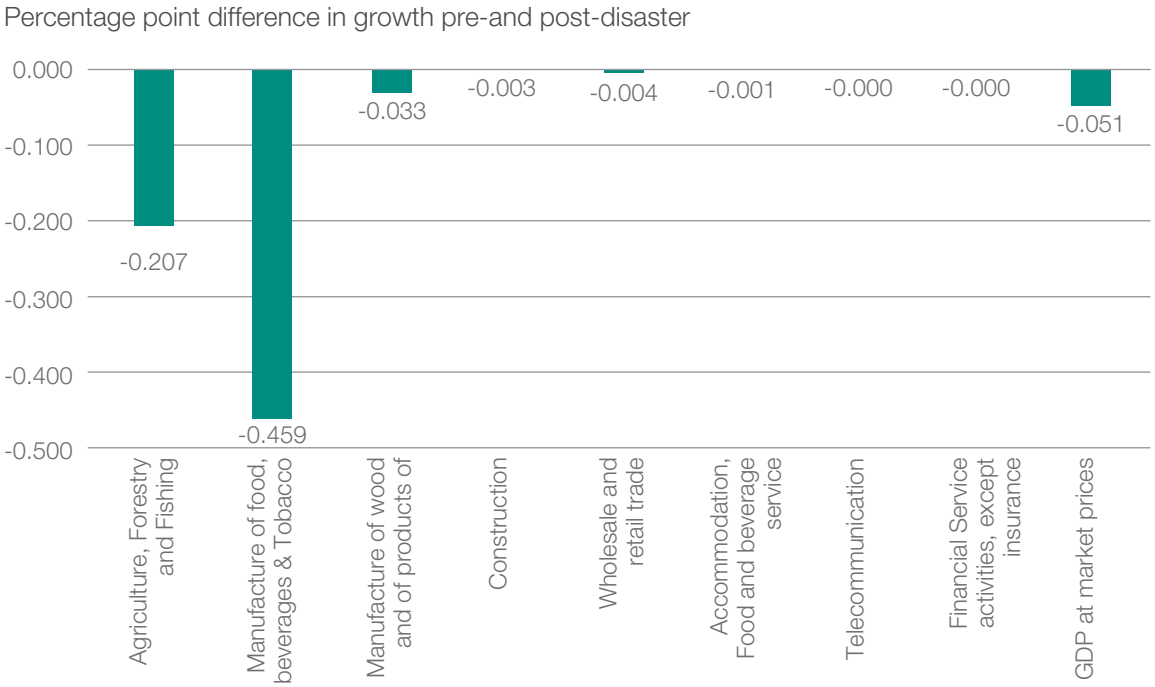


Figure 22. Disaster impact on projected 2016 GDP growth rate. Sources: PDNA team, World Bank and Department of Census and Statistics.

In addition to production losses, the significant damage to housing (LKR 55.8 billion) may have led to a negative impact on the sector of Real-estate activities (including ownership of dwellings). However, the impact in the housing sector can only be estimated once the number of houses under formal ownership is determined, and the discount coefficient for ownership is known, which is currently lacking.

Inflation

While it is expected that the disaster would have had an impact on inflation (in particular given the damages and losses estimated in the agriculture sector) it is difficult estimate this because of data limitations of the impact of the disaster on food and non-food prices.

The food price index level in the National Consumer Price Index (NCPI) increased discretely in June and July, but it is difficult to identify the cause, as VAT rates were also increased in the same period.

Balance of payments

Current account impact

The expected direct impact of the disaster would be a drop in exports, as many tea traders reported damage to their inventories However, the latest external performance report by the Central Bank of Sri Lanka shows hardly any impact on exports of tea in June and July 2016 compared to June and July 2015 that could be attributed to the disaster.

There was no evidence, either through the media, or clearly visible in the data, of a surge in private inward remittances to help family members cope with the disasters.[170]

170 In the case of Nepal remittances spiked after the earthquake of 2015, bucking a downward trend in remittances from the Middle East.

Capital account impact

Having declared a national disaster,[171] the Government requested a US$ 100 million (LKR 14.4 billion at the end-2015 exchange rate) disbursement from the World Bank's Catastrophe Development Policy Loan with Deferred Drawdown (CAT-DDO).

Fiscal impact

The disaster is estimated to have the following impact on the fiscal accounts.

Revenue impact : The direct impact would be the decline in growth and profits in the affected sectors leading to declines in corporate income tax. While the sectors reporting losses (see Table 107) accounted for about 49 percent of corporate income tax revenue in 2014/15, the estimated impact of the disaster on tax collection is negligible. The reason is that the largest sector in this group, Financial Service activities, except insurance and pension funding and auxiliary financial services, did not record large losses and the estimated impact on corporate income tax collection from this sector is negligible. It is estimated that the negative impact of the disaster on the growth of the two sectors most affected (Agriculture, Forestry and Fishing and Manufacture of food, beverages & Tobacco) will lead to a reduction in corporate income tax of LKR 22 million on a total projected corporate income tax revenue collection of LKR 134 billion. The total impact of revenue is estimated to be-0.0013 percent of GDP. It was not possible to estimate the direct impact on other taxes, such as personal income tax, VAT, NBT, trade tariffs and other tariffs due to the lack of availability of data.

In response to the impact, the Government reduced the import cess on imported water and beverages[172] from 35 percent to 5 percent. It is estimated that this would have led to a revenue loss of LKR 141million.

While the preliminary disaster impact report by the Ministry of Finance[173] shows the donations received from various bilateral and private donors amounting to US$ 5.5 million or about LKR 794 million, it is not clear which flowed into the budget and which ones were channelled through relief agencies. For this reason, the fiscal impact of donations is not shown.

Expenditure impact

The direct fiscal cost of the disaster can be separated into capital expenditure to rehabilitate damaged public sector assets and current expenditure to cover economic losses on public sector assets. Table 104 shows that the total damage to public sector assets was LKR 8,085 million, primarily in the sectors Food Security, Agriculture, Livestock, Fisheries, Irrigation and Transport, which are projected to add to public capital expenditure in 2016. The economic losses on public sector assets are estimated to be LKR 1,665 million, primarily "Housing, Land and Settlements", "Power Supply" and "Environment", which is projected to add to current expenditure in 2016. The total impact on expenditure is estimated to be 0.0797 percent of GDP.

This leads to a combined negative impact of 0.081 percent of GDP on the fiscal deficit for 2016.

171 As per Gazette Extraordinary, No. 1970/16 of June 8, 2016.

172 "Imported waters, including mineral waters and aerated waters, containing added sugar or other sweetening matter or flavoured, and other non-alcoholic beverages not including fruit or vegetable juices of heading 20.09." as per Gazette Extraordinary No. 1973/21 of June 28, 2016.

173 Estimate of Damage due to Natural Disaster in May 2016 and Post-Disaster Recovery Plan, Ministry of Finance, June 2016.

Debt

The increase in the projected fiscal deficit could lead to a higher level of public debt. Pre-disaster estimates suggested that the public debt-to-GDP ratio could fall from 76.0 percent of GDP at end-2015 to 75.8 percent of GDP at end-2016, thanks to the onset of a medium-term fiscal consolidation.

If, however, the budget deficit will be 0.81 percent of GDP wider than projected in 2016, the public debt-to-GDP ratio would reach 75.9 percent of GDP by end-2016.

	Pre-disaster (LKR mn)	Post-disaster (LKR mn)	Difference (LKR mn)	Difference (% of GDP)
Total revenue, including	1,555,840	1,555,677	-163	-0.0013
Corporate income tax	133,594	133,572	-22	-0.0002
Import cess	50,697	50,556	-141	-0.0012
Grants	12,077	12,077	0	0.0000
Current expenditure, including	1,758,428	1,760,093	1,665	0.0136
Additional loss-related		1,665	1,665	0.0136
Capital expenditure, including	503,320	511,405	8,085	0.0661
Additional damage-related		8,085	8,085	0.0661
Total expenditure	2,261,748	2,271,498	9,750	0.0797
Fiscal balance	-693,831	-703,744	-9,913	-0.0810
Fiscal balance (% of 2016 GDP)	-5.7	-5.8	-0.1	
Explicit disaster-related borrowing:				
World Bank CAT-DDO		14,406	14,406	0.1288

Note: The pre-disaster fiscal projections are World Bank projections, as updated detailed Ministry of Finance projections after the revisions to budget revenue and expenditure decided by Cabinet in March 2016 were not available at the time of this report.

Table 108. Estimated impact on 2016 fiscal accounts of disaster, relief and repaid measures. Source: Ministry of Finance, PDNA team.

Comparison to other disasters

Based on the reported damage and losses and impact on GDP, this is not a significant disaster when compared to other floods elsewhere since the early 2000s (Figure 23).

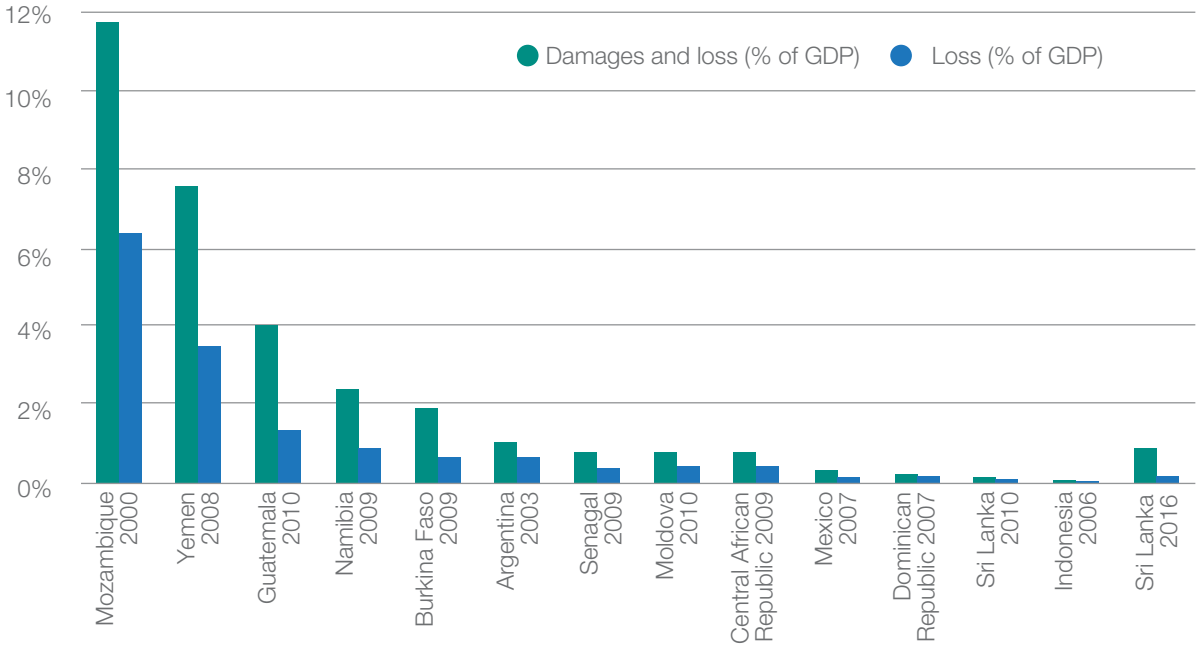


Figure 23. Sri Lanka May 2016 disaster compared to other disasters. Source: Global Facility for Disaster Risk Reduction.[174]

Sector Assessment Methodology

The PDNA Guidelines for assessing the macroeconomic impact of disasters prescribes a methodology to link the sectoral damage and loss impact of the disaster to the national accounts in a systematic way. The analysis of the macroeconomic impact focused on the economic losses attributable to the private sector through the agriculture, industry and services sectors. The projected gross production for 2016 of each subsector was reduced by the loss due to economic disruption. Assuming that the production structure linking gross production, intermediate consumption and value added for each subsector was unchanged, this yields a new post-disaster projection for value added. The difference between the pre-disaster and post-disaster value added is the impact of the disaster in each subsector. Using the sector-specific deflators, the impact on the growth of real value added for each subsector is estimated.

Data challenges

At the time of the PDNA exercise, only limited macroeconomic, fiscal, inflation and external sector data was available. For this reason, the PDNA cannot reach a firm conclusion on the impact of the disaster on some macroeconomic variables.

Inflation : In order to clearly separate the impact of the disaster on inflation from other factors, it is important that monthly or weekly food commodity price data with island-wide coverage is made available. This would allow the future assessments to identify seasonal effects and use the data from parts of the island not affected by the disaster as the baseline.

Trade : In order to arrive at a more accurate assessment of the export impact, more detailed exports data (by volume and value) covering more post-disaster months is needed. No data was available on imports related to disaster relief.

174 *Refer to https://www.gfdrr.org/damageandlosses*

Human Development Impact

Executive summary

This chapter assesses the human impact of the floods and landslides on the affected population. It attempts to portray the social and economic vulnerabilities of the people, how they responded and are coping with the disaster and the present needs of people as identified and prioritised by the people. In so doing, the chapter also complements the findings of other sectorial assessments-particularly livelihoods, housing, and DRR-in providing recommendations on how to address needs in these areas from a people perspective.

The biggest impact for households is the personal losses in livelihoods and of houses. Both urban and rural communities face the big challenge of restarting livelihoods to sustain their families. People have so far coped with their economic losses by using up savings and taking loans. In fact, while Government assistance has been sufficient to meet the immediate needs of affected families, it lags behind in compensating for asset losses. As a result, the top three recovery priorities identified by the people are: a) Livelihoods Recovery; b) Housing relocation and reconstruction; c) disaster preparedness. The assessment also points to a high psychological impact on the affected population irrespective of their gender, age and social status.

This human impact analysis recommends a number of interventions to address the social and economic needs of affected families suggesting, for instance, a much larger and targeted coverage of social protection schemes, prioritising assistance for women working in the informal sector and agriculture labourers, training and expanding small businesses and bringing them under insurance coverage. The recommendations call for a much larger investment in disaster preparedness of communities, improved early warning systems and safe shelter management. The chapter also recommends that housing reconstruction and relocation be planned together with the communities and that a guideline outlining the process of relocation is developed.

Pre Disaster Context and Baseline

According to the UNDP Human Development report, Sri Lanka ranks 73rd out of 188 countries in 2014. It has achieved significant economic growth and positive results in education, health and improving life expectancy, surpassing most of the MDG targets set for 2015. However, while most indicators present a success, there remain specific challenges. The country has a low level of extreme poverty but has nearly 25 percent of the population lives just above the poverty line of US$1.50 per day. Although national poverty has declined from 15.2 percent in 2006/07 to 6.5 percent in 2012/13, there are income disparities within the provinces. In terms of gender equality index, it ranks very poorly in the area of political and labour force participation. The government's social protection schemes, apart from health and education benefits, do not reach more than half of the people living below the poverty line due to "manual registration and identification and lack of capability to actively search for excluded individuals".[175]

The Trade, Industries and Services sector account for 82.8 percent of the GDP with trade the highest, followed by Services and Industry. The Agriculture, Forestry and Fisheries sector of Sri Lanka account for 7.9 percent of the total GDP[176]. The Services sector has the highest labour force (45.9 percent) followed by Agriculture sector (28.4 percent) and Industry (25.7 percent).

175 *World Bank, 2015, Sri Lanka: Ending poverty and promoting shared prosperity-a systematic country diagnostic*

176 *Central Bank of Sri Lanka, 2015, Annual Report 2015.*

Profile of affected population of most affected district

Nearly 25 percent of Sri Lankans are nearly poor, as defined by living above the official poverty line but below US$ 2.50 per day. There are significant regional differences of the poverty. There are rather high percentages of extreme poor living in the former conflict districts in the Northern Province and the Eastern Province as well as in Monaragala district, i.e. in areas not so much affected by the floods and landslides. However, the majority of the poor and as well as the bottom 40 percent live in urban areas of the island such as Colombo and Gampaha districts, which were severely affected by the disaster.

Colombo and Gampaha : According to the 2012 Census, Colombo and Gampaha have a combined population of 4,604,450 people and 1,161,224 housing units. Colombo has the highest population density in the country with 3417/per km^2 followed by Gampaha with 1711/per km.^{2} It also has the highest number of female-headed households (FHH) among the six most affected districts. The two urban districts contribute 24 percent[177] of the total business in the country. Colombo has the highest number of establishments (135,998) followed by Gampaha, which has 127,734 units, but with a higher concentration of construction and industry establishment, which makes them more vulnerable to disasters compared to other regions. The population affected in the two districts is 302,874, which is more than 50 percent of the total population affected by the floods. By far the worst affected division countrywide is Kolonnawa where 155,062 people were affected, which is 81 percent of the total population in this GN division. Though it is not among the poorest divisions in the country, these two districts have the majority of the poor along with other districts in the Colombo-Kandy-Galle urban conglomeration due its high population density.[178]

Kegalle : In Kegalle 34,833 people have been affected by the floods and landslides. A significant proportion of the population lives off export crops such as coffee, cloves, pepper and tea plantations. The land in the district is extremely unstable and has been marked out as high-risk zones by the NBRO. The landslides and flood affected were concentrated in four GN divisions. The number of families affected by the floods and landslides in Kegalle district was relatively low in absolute numbers, however it had the largest number of deaths and missing persons (52 dead and 99 missing). The landslides in Aranayake division caused the largest fatalities and injuries in the landslides and floods. A total of 3,754 houses were damaged in the floods and landslides in the district. Of the 20,000 people displaced by the landslides, more than 10,000 were accommodated in 97 evacuation centres while the others moved to stay with families and relatives.

Anuradhapura and Puttalam : Anuradhapura's agriculture based economy is among the hardest hit in this floods and sustained the highest damage and losses to paddy and other food crops. Farmers reported having lost all crops and land filled with sediment rendering it useless till cleaned. Women in Anuradhapura are engaged as agriculture laborers and also working in coconut plantations. The coastal villages of Puttalam were hard hit with fishermen families living near the coast, losing their income due to damaged fish ponds and shrimp tanks. Chilaw urban area was flooded with the local hospital having to evacuate staff to new locations for a short time. The damage to houses is relatively low compared to Colombo and Gampaha.

177 Department of Census and Statistics, 2015, Non Agricultural economic activities in Sri Lanka: Economic Census 2013/2014.

178 World Bank. 2015, Sri Lanka: Ending poverty and promoting shared prosperity-a systematic country diagnostic.

Disaster Impact

This section exclusively describes the impact of the floods and landslides from the perspective of the affected population on those specific areas that have been identified by them those that were affected the most and where the priority needs are-namely: livelihoods, housing and DRR. Additionally, the section looks particularly at the impact of the disaster on specific groups of the population: women and children as highly vulnerable groups, and government officials since by being affected they could not fully perform their functions as civil servants with negative consequences on the ability of the government to provide its services to the population at community level.

Income and Livelihoods

The floods and landslides have affected the livelihoods of about 125,957 households,[179] and 251,914 workers across 22 districts and resulted in the loss of about 1.5 million work days and LKR 4,912 million of personal income in Financial Year 2016. The six disaster affected districts account for 281,226 establishments, which is 41 percent, i.e. almost half of the industry and trade in the country, and account for about 780,000 employees. The manufacturing and trade sectors damages and losses in all districts have been assessed to be LKR 19,700 million of which the pay-out by insurance was LKR 15,710 million. The major damages and losses were sustained by two sectors only (food and beverages and tea) were estimated at LKR 13,925 million accounting for approximately 88 percent of insurance pay-outs. The damages and losses to informal sector in Colombo and Gampaha districts is estimated at LKR 3,990 million which equal to 20 percent of the total flood and landslide impact. This assessment only includes damages and losses to the private sector enterprises and not to State Owned Enterprises.

Urban Livelihoods : The economy of the urban districts is largely dependent on Trade, Industries and Services sector. The Industry and Commerce sectors were deeply affected by the floods. The most affected is Gampaha district (72%) due to the high concentration of industries along with a large horticulture industry, pineapple plantations and other fruit plantations, which were damaged by the floods. Insurance claims received from the industry and commerce sectors amount to LKR 15,700 million, of which two corporate companies in the beverage sector account for almost 50 percent of the insurance claims. Both these companies are located in Gampaha. In addition, the export-processing zone in Gampaha has 60 commercial establishments and employs 21,862 people. Many of these commercial establishments had closed down during the floods and some were still non-functional during the field visits conducted in the last week of July. There is no data on the 780,000 employees that worked in the industry and commerce establishments in the country. From field visits, it is known that several companies were forced to close operations for a period of three months and may or may not have paid the employees for the duration that the company was closed. There were a large number of young girls employed in the establishments in the free trade zone companies, at the time of the field visit, many young girls who were tenants in the Malwana GN division had left for their villages. It was reported that as tenants, they did not receive any compensation for their lost assets.

Apart from the formal employment, it said that a large share of the 1.3 million self-employed, people engaged in the informal sector residing in Colombo and Gampaha districts were severely affected by the floods. The local residents in Colombo and Gampaha disclosed that they had to take loans from micro finance companies and moneylenders at an exorbitant rate of 36 percent per annum to restart their livelihoods. This has increased the debt burden of the families. Some families even pawned their jewellery to meet their immediate needs. Many families who were daily wage earners reported their inability to go to work for a week or more in some places due to the floodwaters. This translates to LKR 2,800[180] for an unskilled labour for a week per person.

179 Source: National Disaster Relief Services Centre

180 Minimum wage rate for unskilled labour taken at LKR 500 per day

In urban areas it was noted that women contributed to the household income through various small businesses and thus affected more due to the floods. As already mentioned that many of the women were engaged in home-based industries, so damage to their houses resulted in an immediate loss of their income. For many women, the income provided security, economic independence and a better say in household spending and decision making. One woman interviewed mentioned that an entire plot of 177 square metres of land, on which she grew flowers, was completely destroyed. This young woman mentioned **"I will have to start all over again with land preparation, fencing, pots and equipment to get back into business. My business is gone and I have no funds to restart my flower garden".** The costs of the small businesses were estimated to be between LKR 50,000 to LKR 100,000. With no insurance coverage and without external assistance it is likely that many women like her would be put off work altogether.

In Gampaha, almost all communities had home gardens, which provided families with their daily food requirements. Women took care of the home gardens. Damages caused to the home gardens compelled families to purchase their vegetable requirements from the markets increasing the amount spent on food. In urban areas, daily wage owners, women managed home run businesses emerge as the most affected by the disaster and fall into debt due to the loss of livelihoods and income.

Rural Livelihoods : In 14 districts where the economy is predominantly based on agriculture, over 34,000 agricultural labourers have lost at least five working days and wages worth LKR 2,882 due to floods from May 15 to 22, 2016. This is a significant amount for the households who rely on each days' wages to provide for their food and other needs. Additionally, as a result of loss of livelihood opportunities due to the floods, the food security status among flood affected agricultural labourers is likely to have deteriorated. Most of them were not able to cope up with the current expenditure on food due to the reduced purchasing power as a result of limited earnings.

Fishing communities in Puttalam suffered greater losses due to the floods. The total damage to the fishing sector is estimated as LKR 112 million, out of which the highest damage is reported among fishermen involved in the commercial seaweed farming (sea cucumber) and shrimp farming. Shrimp farms in particular are capital intensive, hence this is a huge loss to the families. 71 fishing ponds have been damaged during the floods. Coastal fishing was disturbed due to the high-wind and heavy rains; fishermen were unable to engage in fishing activities for approximately five days from May 15 to 20, 2016.

The assessment could not estimate the overall loss of livestock in all districts except in Kegalle. Livestock is known to be an important secondary source of income for many rural and urban households. There was enormous shortage of poultry in the Colombo market after the floods. Several families reported losing their livestock in the floods, this represents a loss of their secondary source of income which is a fall back option for the families in time of need.

According to the GoSL rapid needs assessment, 12,000 households in four districts (Colombo, Gampaha, Kegalle and Ratnapura) were reported as severely food insecure due to the serious impacts on their livelihoods and livelihood assets. The affected populations were identified as in need of the external food assistance for a minimum period of three months. To support the families, the Ministry of National Policies and Ministry of Social Empowerment and Welfare with funds from World Food Programme is providing cash assistance for 10,000 the most-vulnerable economically poor households for a period of three months.

In the rural areas, the agricultural labourers emerge as the most vulnerable group of people who may face insecurity and general decline in living conditions due to the loss of their wages and work.

Housing

The total number of houses affected in the current floods and landslides is 58,925-of which 6,382 were destroyed and 25,958 were partially damaged with 26,585 suffering only minor damages. Over 85 percent of the damage was reported from Colombo, and Gampaha Districts affected by urban flooding and 7.3 percent from landslide and flood affected areas of the Ratnapura and Kegalle districts. The large-scale damage to houses has left people not only without shelter but also in many cases without their livelihoods.

Effects : In Colombo and Gampaha districts, many families who lost their homes live along the banks of Kelani river and its associated canals systems. Poor quality construction was the main reason for housing damage in urban areas as over 65 percent of the affected houses were improvised or semi-permanent constructions. The floodwaters inundated houses and buildings with up to 5-6 feet of water. In several low lying areas the water remained for over a week in some places. The stagnant water and debris caused large scale damages to houses and destroyed household assets, including livelihood related assets. This caused in turn significant losses and disruption to small business and commercial activities. Families, mostly women, used their houses and homestead land to run a variety of businesses, which include supplying home cooked food to restaurants, sewing, growing flowers, making decorative pottery. These families simultaneously lost their houses as well as their livelihoods. Many families have lost their personal documents, such as certificates, land deeds etc and jewelry, along with the household assets. In addition to this, families have lost their space for social and cultural activities and reported a feeling of insecurity and fear about not being able to recover from their losses.

Impact : In the Sri Lankan cultural context, a piece of land and a house are major economic assets of a family and a symbol of social status in the community. Therefore, the loss of a house has a larger psychological impact besides the immediate effect of losing their livelihoods and shelter. Loss of housing may lead to displacement of families, migration and forced relocation, which can result in an identity crisis for families whose ancestral roots and cultural ties are tied to land and the community where they have lived for generations. Homeowners who will be relocated due to the landslides are likely to go through these issues.

The loss of housing has a different impact on tenants. If the house they rented is damaged and rendered inhabitable, tenants may be forced to pay higher prices for renting in other places and possibly higher transportation costs to their place of work. In places like the Biyagama Export Processing Zone, where there are reports of young girls staying in shared accommodation, the impact is higher, they not only face the loss of income due to the closed production but also may have to pay a higher price to rent accommodation for keeping their jobs in the factories and companies. The loss of a home, places a double burden on the tenant as they bear the costs of the loss themselves while the house owner's loss is likely to be compensated by the insurance.

Housing Relocation in Colombo and Gampaha : The largest number of houses (25,289) that are to be relocated are also those along the reservations and buffer zones of Colombo and Gampaha districts. It has been proposed that these families are relocated to new areas in accordance with the Western Megapolis development plan and may take several years before this relocation can be done. There are a high number of improvised houses in the two urban districts in the encroached lands. The decision on relocation of these families through regular development plan has an implication on the lives of the people since their current houses are already damaged by the floods. There is a need for transitional shelter during their long wait period for a permanent house in a new location and such need has to be addressed by the Government.

Housing Relocation in Kegalle and Ratnapura districts : In the districts of Kegalle and Ratnapura, a total of 2,361 and 391 housing units are to be relocated and reconstructed. The relocation plans for the landslide-affected families in Kegalle is already planned by the Government. The assessment team was informed by the Kegalle District that 374 acres of land has been secured for relocation from two estates (Ambadeniya and Kalugala) lands. The site clearance and plotting have been commenced and the construction of 48 houses started on July 28, 2016. About 1,000 families have already agreed to move to the identified location.[181] The Government will seek the assistance of the army to undertake the reconstruction; other agencies are also expected to contribute. The Government has proposed three types of house options/designs prepared by NBRO. The district authorities have also informed that it will provide 250-500 square metres of land for each family to resettle. The size of the land will be depending on the land price (smaller land in the resettlement areas close to the urban areas). For families that are not open to relocation in these sites, the District officials have proposed a compensation package of LKR 400,000 to the central government to support voluntary relocation to other sites of their own choice.

The total number of houses damaged in Anuradhapura and Puttalam is little over 500 units, most of which are permanent houses. The housing assessment team recommends an owner driven approach for these houses.

Study on Relocation in Kegalle : The University of Kelaniya conducted a detailed study of 3,469 families in 11 DS divisions of Kegalle district to provide a people's perspective of the relocation and resettlement plan. The study confirms that majority of the families affected by the landslides were willing and ready to move to government identified sites. About 500 families are looking to resettle in new land in the same areas and a small percentage of families plan to take the compensation and move in with other family members. The study went into a detailed analysis of the people during the transition period and issues that require special attention in the relocation process. The study made the following recommendations:

- Prioritise resettlement of families that had fatalities and injuries due to the landslides.
- Provide families with food rations and rental allowance for each month till they are permanently relocated.
- Provide incentives to support voluntary relocation.
- To the extent possible, communities staying together should be relocated to the same area so that they retain their social and cultural relationships.
- Set up an Information dissemination cell within the Government Agent's office to provide information on the resettlement to communities.
- Organise the communities to facilitate their participation and contribution to the resettlement process.
- Ensure that housing designs in the relocation sites provide space for further expansion by the households themselves.
- Add to the National Land Use Policy specifics of the land use in landslide prone areas.

All the above recommendations resonate well with the discussions that were held with the communities. Some of the recommendations are included within the recovery strategy of housing and environment sector chapter.

181 Source: Field visits to Kegalle

Community views on relocation : In two urban districts, Colombo and Gampaha, a majority of the families live in permanent houses and semi-permanent houses. There is sharp division of opinion among communities on the issue of relocation. Families in Singhapura GN division, Sedawatta GN division and Malgama GN division of Kolonnawa DS division district are willing to voluntarily relocate to a new area given the frequent flood risks. The communities expect that they will be compensated with houses having similar space and facilities for livelihood activities. Some families were willing to accept compensation based on the current market value of their land and house and find a new location to move. Communities also emphasised the need to be in close proximity to work. However, there are a number of communities that are unwilling to move from their traditional land. The Mabima East GN Division, Pattiwila South GN Division, Malwana GN division, Udamapitigama GN Division have all expressed the need to reconstruct on their own land with better flood protection measures. These are households, who are either engaged in horticulture or working in the Biyagama free trade zone and therefore understandably unwilling to relocate from the livelihood opportunities linked to the land.

Community Expectations : The families were still awaiting financial support from the Government for house repair. Most communities have expressed the need for financial support for repair and reconstruction of their houses, people are willing to take low interest loans to repair their houses and restart livelihoods.

Disaster Preparedness

The field visits and assessment revealed that urban communities are less prepared for the disaster than rural communities. Out of the nine communities visited, only two communities of Gampaha (Udamapitigama GN division & Malwana GN division) and one community in Puttalam district confirmed their participation in any sort of community preparedness exercises. The communities in Anuradhapura and Puttalam mentioned that they have experienced floods almost on an annual basis in the last five years. However, they were not informed of the possible impacts by the current floods. Local people in Kolonnawa DS division reported that with the influx of people, many of whom are temporary or new residents it is challenging to get organised as a 'community' and prepare for disasters.

Overall it was noted that, the community preparedness plans in villages established after the tsunami are now no longer functional, creating a critical gap in EWS, Response and Relief. In areas where Red Cross is active some sort of community preparedness is still in place.

Early Warning : only one of the four focus group discussions held in the hard hit Kolonnawa DS division and in two communities in the Gampaha district, confirmed that they received early warning while the rest reported that they did not receive any warning. Many people heard about the warning through the media, but due to the lack of information on the severity of the floods, people did not take cognisance of the warning.

Communities in **Kegalle and Ratnapura,** which were affected by the landslides, informed that they did not receive any warning ahead of time on the possibilities of landslides due to the heavy rains. In some landslide prone communities, the warning came in only after the heavy rains started, making it a difficult decision for communities to leave their houses and go elsewhere. The heavy rain combined with lack of information on the location of the safe shelter forced many people to stay indoors in what they perceived as the best option at that time.

Families in **Anuradhapura and Puttalam** received flood warning and evacuated in time. Both the communities confirmed that floods are a recurrence in two districts in the last three years. It has been a usual practice for the past years for communities to move in with friends and relatives and come back after 15 days when flood waters have subsided. This time the flood duration lasted much longer and people

were unable to save their household assets.

Search and Rescue : There were mixed responses from the communities on the efficiency of the search and rescue services. The search and rescue efforts by the Army and the Navy were seen as commendable. However, for most part, local communities had to cope by themselves using their traditional boats and improvised floating devices. Communities and Grama Niladharis (GN) noted that the evacuation and search and rescue efforts would have been more efficient had the military and navy worked together with the local leaders and GN's who were familiar with the vulnerable households and topography of the villages. Local Red Cross teams were reported to support search and rescue efforts in several communities.

Evacuation : Based on reports received from communities, people received evacuation orders from their local government officials but largely ignored the orders as they were not convinced of the severity of the floods. People did not evacuate until they were forced out by rising floodwaters, which inundated their homes. Households cited the following reasons for non-evacuation:

- No knowledge of the designated safe shelter.
- Lack of basic sanitation facilities and privacy for families and therefore evacuation was seen as a last option.
- Fear of looting of household assets in their absence.

Most families preferred moving in with other relatives and friends, only families who had no other choice moved to the evacuation centre. Two surveys conducted by Red Cross and University of Kelaniya confirm that a higher number of people in the landslide affected areas of Kegalle moved in with relatives rather than staying in evacuation centres. On the issue of security, several communities appreciated the security provided by the Government in guarding their household's assets after evacuation. Only one GN division (Singhapura) in Kolonnawa reported theft of their household assets.

Management of safe shelters : There were a number of issues identified in the management of the evacuation centres/safe shelter, most related to lack of space and privacy for families, the severe strain and poor condition of the sanitation facilities; absence of any special arrangements for disabled, elderly and pregnant women and lack of space for children for their activities. The lack of sex and age disaggregated data of people hosted in the evacuation centres hindered targeted assistance for the vulnerable groups. Additionally, according to several reports, many people in the camps suffer in trauma experienced during the landslides due to the loss of family members, their homes, lost assets and mostly fear and anxiety for the future and feeling of helplessness. However, fear and anxiety about the future was not only restricted to people living in camps but also people in other areas also expressed anxiety about the lack of options to rebuild homes and restart livelihoods. Other issues related to management of the evacuation centres are reflected in the DRR sector chapter and the gender sector chapter.

Relief : In most affected villages, the local Grama Niladhari with the support of communities led the distribution of relief supplies including organising community kitchens with Government funds. There was an outpouring of support to communities from local people, charities, NGOs, Red Cross and international agencies. The support included food items, NFI kits, sanitary packs, childcare, water purification tablets & sanitation services. This assistance concentrated in urban areas and in the evacuation centres and less for remote villages. During the field visits, at least two communities in Anuradhapura and Puttalam said that the quantity of dry food rations was not sufficient to meet the needs of the family. Overall, however in the Colombo and Gampaha districts, people expressed satisfaction with the supply of food rations and other supplies which helped sustain them since families lost livelihoods.

Following the floods and landslides, the Government sanctioned LKR 10,000 to each family for their urgent needs. The households interviewed in 3 GN divisions of Gampaha district confirmed receipt of this financial

assistance, however, many families in Kolonuwa GN division were still awaiting any compensation from the government. There were also reports in one GN division in Gampaha that tenants did not receive any compensation as this was only meant for house owners. This pre-condition prevented many young boarders, mostly girls employed in the free trade zone from receiving support.

Community knowledge on Risks : The focus groups discussions revealed that both, rural communities and urban communities, were well informed of flood risks. Communities in Puttalam were identified three major causes for annual floods in the district: a) construction of the dam in Kurunegela district, b) the river bank erosions and c) sand bars with backwaters that prevented water flow into the sea. The urban communities in Colombo and Gampaha identified four major causes of the floods: a) large scale land reclamation, b) new and unplanned settlements by filling in the water retention bodies like ponds; c) sand mining and d) sedimentation of river beds and canals. However, they did not anticipate the severity of the floods. The last experience of the floods of this scale was in 1989. An elderly woman in Malwana GN division commented that they reconstructed the house after 1947 floods with a plinth of 5 feet to protect against flood. This house still stands today and prevented floodwaters from entering her home. “people have given up the traditional practice of constructing houses with high plinths in flood prone areas” says this elderly member. The loss of the traditional knowledge of the region combined with lack of experience has prevented people in investing in flood safe houses.

Impact on Women

In general, women are one of the most adversely affected groups when it comes to social disruption and disasters. In May, the floods and landslides affected 493,319 people, half of which are women and girls. Field visits to affected areas and NGO discussions captured that, in addition to loss of livelihood and employment opportunities, women were particularly affected by trauma from the disaster and loss of family members, lack of security, privacy, basic hygiene and health services (psychosocial support) and concrete coping strategy to restructure their lives.

In Kegalle, women, and particularly pregnant women, staying in camps faced several challenges due to the poor sanitation facilities and lack of privacy between the toilets and shower stalls for men and women.

The floods and landslides changed the work routine of women due to the loss of their livelihoods. As a result of the loss of their livelihoods, women were forced to stay home doing housework or just aimlessly passing time after the chores were done. The lack of engagement in productive activities led to depression in many women, especially those who lost family members during the disaster. Unfortunately, no adequate psychological counselling or trauma support groups was provided to women. Instead, women often gathered among themselves in the common kitchen area to share their problems and needs.

Several national NGOs offered vocational training, such as teaching women how to roll beedis or making flower arrangements etc, to provide women with alternative livelihood options. Many women expressed that they could not concentrate on these lessons as their priority for recovery was not merely learning a new skill, but planning new livelihoods for their families and children.

Impact on Children

More than 24,800 children were affected in different ways and to varying degrees as a result of the recent floods and landslides disaster. In Kegalle district, 10 children were killed during the landslides, 4 children lost both parents and 7 lost their fathers. Others lost relatives, neighbours or friends. Many children have also been displaced from their homes together with their families and spent time in or currently live in displacement camps.

The experience of living in camps has been stressful for children and their families. The camps were overcrowded and initially lacked adequate partitioning facilities that provide women and girls with privacy for changing clothes and general protection. The lack of attention to some of these issues by the poorly trained camp management officers, as well as to specific considerations for children, meant that children in camps were more vulnerable to the risk of abuse and exploitation. Reports indicated that parents would prefer to leave their children, where possible, with relatives or friends rather than alone in the camp due to safety lapses. It was observed by child protection agencies that parents appeared preoccupied with issues of shelter, food and income and often had to leave their children unattended and alone. This was reflected in children's reports of feeling disengaged from the relief and recovery process and fearful of the unknown future ahead of them. Due to disruptions in schooling, some children spent considerable time aimlessly in the camps, which was also considered a risk, particularly amongst the adolescent age group who had easier access to alcohol and cigarettes in the camp setting. It is also evident from discussions with affected children that they have not been involved in any efforts related to disaster risk reduction either at the community level or in schools as part of school safety planning.

The disruption to education services also delayed a return to normalcy in their lives. While some children were able to return to schools that were not damaged or only partially damaged, many others could not, particularly in cases where the school was significantly damaged, had to be relocated or was used to house displaced persons. This meant a significant disruption to their education and, for many, having to attend another school in the area. At a time when children have suffered so many losses, the new and unfamiliar school environment is an added source of stress. Another factor for low attendance in schools during the early post-disaster period was the loss of education materials, uniforms and shoes which compelled children to stay at home despite allowances made by the school. This situation was further exacerbated for older students as some lost their class notes in preparation for their General Certificate Examinations in 2016, which caused a lot of panic amongst them.

The children living in some displacement camps also had the added challenge of a lack of quiet spaces to study or do homework, as well as transportation difficulties in accessing the school. Low attendance rates and children reporting being unable to study due to stress are signs that more needs to be done in schools and at the community level to help children cope and recover from a disaster.

Effects on Governmental Staff and Services

As part of the affected population, many local government staff were also hit by the floods and landslides-particularly, the Grama Niladharis (GNs) who work and live in the communities. Their houses were damaged and personal assets lost. This inhibited them from discharging their normal functions. Female GN division leaders faced more constraints than their male counterparts. Their mobility was restricted due to the floodwaters and they were unable to lead the immediate response activities of the flood. The GNs, to the extent possible, organised distribution of relief services to affected communities. This included mobilising local communities to engage in SAR activities, community kitchens for flood supply, cleaning of debris.

The floods and landslides also caused some damage to the government structures. Several of the GN offices were flooded and all documents were destroyed. In one Division in Colombo, of the 18 of the 39 GN offices were flooded. Indika Irangani, the GN of Kelanimulla says: “all the government documents and records were destroyed, including the notes on land issues recorded in the Government diary was completely destroyed, trying to recreate all these notes will be an extremely difficult task”. Apart from the issues related to lost documents, Government officials expressed difficulties in managing the large workload like disbursing compensation to families due to the shortage of staff. Several GNs reported that they already had a backlog of work and their regular work was temporarily postponed due to the on-going work related to the floods and landslides. Going forward, many staff expressed the need for strengthening local government offices with additional capacities to deliver relief and recovery assistance.

Coping Strategies of People

The assessment reveals that most families relied on their community and neighbourhood networks for immediate needs. Local clubs, the Red Cross Societies and private charities stepped in with search and rescue efforts till the government assistance arrived. While Government took care of food provisions and water supplies, communities rallied together to cook food and attend to other needs of families. Most importantly, communities supported households to clean their debris trying to bring back some semblance of normalcy to their lives. Families who had a choice moved in with families and relatives for extended periods of time and families who had no choice moved to the evacuation centres.

The rapid assessment findings also further revealed that many families sold their assets or pawned jewellery to meet the immediate basic needs. Assets and savings depletion were reported as common among most of severely affected households. Moreover, a large majority of small business owners in the urban districts and agricultural farmers in rural districts have obtained credit from informal sources at a very high interest rate to restart livelihoods and meet urgent re-planting requirements. This has increased the debt burden of many farmers who had already taken loans to cultivate the Yala season, which was destroyed, by the floods.

Recovery Needs: Perception of the Affected Population

One of the objectives of assessing the human impact of the disaster was to find out the recovery priorities as identified by the affected communities. As a part of the discussion in the field visits, communities were requested to rank their priorities for recovery. These differed from community to community depending on the extent damages and losses sustained by the families in the floods and landslides. Most of the recovery priorities are reflected in the sector chapters but presented here again to reinforce the importance of the support. These priorities aim to address fears of insecurity, homelessness, reduce debt burden of families, help people to cope better with their losses and increase their resilience to future shocks and crisis.

Assistance for relocation and reconstruction of houses : This was listed as a top priority for families living in evacuation centres, primarily in the landslide affected districts. While expressing the need for assistance for relocation, families emphasised the need to be able to pursue their livelihoods in the relocation sites.

Assistance for restoration of livelihoods : In the urban districts of Colombo and Gampaha, the first priority was financial assistance for restoration of livelihoods, replacement of lost livelihood assets. Women in particular emphasised the need for access to low interest loans and credit services so that they can pay off their debts. The second priority of people was the repair of damaged houses and replacement of assets.

Assistance to strengthen local emergency response and preparedness capacities : Local communities are aware of the flood risks and wanted resources like boats and generators placed locally with communities. People wanted information on the designated safe shelters and some level of preparedness to support activities such as search and rescue, first aid and other management of safe shelter skills. One of the issues highlighted by communities in Gampaha was the need for water testing kits. Communities which are dependent on well water unsure if the well water was safe even after dewatering as they did not have the means to verify if the water was potable.

Addressing Disaster Risks : A common request from communities across both rural and urban areas was the need to address the causes of recurrent floods. Communities living on the riverbanks underscored the need to repair sluice gates, deepen canals and remove sedimentation to allow flow of river water. Communities also pointed out the necessity to regulate waste management, sand mining, illegal land reclamation and prevent riverbank erosion. In Anuradhapura, communities expressed the need for better water management and release of water from the local dams.

Strategies for Recovery and Policy Recommendations

The disaster has impacted the poor, families living in improvised houses and running small business or working as labourers. Recovery should prioritise assistance to the most vulnerable families assisting their social and economic recovery. In addition, an important priority should be to ensure the coverage of all vulnerable families under the social protection systems. Suggested interventions are as follows:

Improve management of Evacuation centres

- Increase and improve sanitation facilities to SPHERE standards in the evacuation centres and camps to provide families with hygiene and privacy.
- Provide psychosocial support to families, particularly to families including women and children who lost loved ones in the landslides.
- Provide support and encourage the members of the evacuation centres to resume livelihoods activities.
- Provide special protection to children, young girls and women to prevent any possible abuse, bullying and violence in the long stays in the camps.
- Keep families informed of the decisions and progress made in relocation of the community and the duration they are expected to stay in the evacuation centre and camps.

Government compensation

- Quick release of compensation to all families affected by the flood and landslides to replace lost household assets and repair-damaged houses. Compensation to all families irrespective of their tenancy status. Prioritise female-headed households, households with disabled and the aged.
- In the long term, ensure that vulnerable people are identified and included under Government social protection schemes.
- Support to the local Government staff with surge capacities to disburse compensation and funds for housing repair and reconstruction.

Assistance for Livelihoods restoration

- Provision of cash grants to households for replacement of livelihood assets and working capital to restart livelihoods. Prioritise household businesses, home gardens and enterprises owned and managed by women.

- Cash for work using local minimum wage rates to provide short term income to agriculture labourers and people working in the informal sector. Use the cash for work scheme to clear any debris in homes, repair local infrastructure, support repair of homes of the most vulnerable families, irrigation structures, canals and other water bodies.
- Immediate cash grant and support to famers to resume plantation activities and support to small farmers engaged in horticulture. In the long-term support to improve productivity, technical support and training to diversify crops, help farmers in storage, processing and marketing products.
- Cash grants and low interest loans to fishermen to repair fish tanks, restart shrimp and sea cucumber farming.
- Work with the companies and factories in the Gampaha Export processing zone and in Colombo city to assess the status of the employees at the factories and ensure that employees have received payments and benefits for the duration of the production closure.
- Support to small businesses to upgrade and register with insurance companies, training in book keeping and other skills required to maintain businesses. Provide access to credit facilities to small businesses to facilitate their upgrade to ensure they qualify for insurance coverage.

Promoting alternative livelihood opportunities

- Using recovery as an opportunity to build resilience, families engaged in vulnerable livelihoods could be encouraged to diversify their livelihoods. In order to do this, a systematic investment in vocational training for people engaged in the informal sector could be organised. Technical skills training could focus on masonry, plumbing, electricity, carpentry and other skills required for reconstruction of the 58,925 houses that will be carried out in the next five to seven years. Armed with such skills, people will have a better possibility of jobs. It will facilitate the upward mobility of the people from low income to better paid jobs.

Housing Reconstruction : The housing sector chapter provides a detailed strategy for the reconstruction of 58,925 housing units across 25 districts. This section highlights and reinforces some of the strategies and policy recommendations for housing reconstruction.

Guidelines on disaster induced displacement : One of the first priorities is, of course, addressing the housing needs of affected districts, followed by relocation of all families living in the encroached areas along the riverbanks. The Government has planned a voluntary relocation of the families, with all necessary services in the new sites. This process may take several years. Even before the process of relocation gets started, it is imperative that guidelines for relocation of the families are drawn with details on the process. This guideline can provide information on the various options for relocation, the role of government ministries and departments, communities and other stakeholders, the packages of assistance provided and other compensation schemes for households that will voluntarily move to a place of their choice. Relocation can lead to potential conflict unless the process is transparent and fair, therefore a guideline, which outlines all the arrangements for relocation, can pre-empt any possible conflicts and tensions by communities.

Community organisation and participation : Community participation is essential for successful relocation and reconstruction. Local NGOs can be requested to organise communities to share information on the housing assistance, contribute to and share their views on the designs of the house, the facilities in the settlement areas, contribute their labour to construction of houses, be informed on quality control and financial accountability and receive technical assistance to rebuild houses reconstructed to disaster resilient standards. Community organisation should be accompanied with a well laid out communication strategy to keep people informed of the progress in housing reconstruction.

Selection of beneficiaries : Given the large number of houses to be reconstructed, it will be necessary to develop a phased approach and criteria to prioritise the beneficiaries. It will be important to ensure that female headed households and families with vulnerable people get the first priority in the reconstruction process and women are given equal rights to land or new housing provided by the government

Capacity Building and technical assistance to households : In view of the recommendation to pursue an owner driven strategy[182] for reconstruction of housing, it would be important that people are provided with technical advice on reconstruction of houses. This will require a larger deployment of engineers, overseers and skilled construction workers to help families construct houses with flood protection features.

Disaster Preparedness and Response : The Disaster Risk Reduction chapter has detailed recommendations, therefore this section focus on aspects related to community preparedness only. The key action points are to a) revive disaster preparedness plans in all flood affected communities through Sri Lankan Red Cross and other NGOs. In the course of development of plans, village youth will be trained in early warning dissemination, search and rescue, camp management and first aid. A simulation held once a year could prepare communities better for flood season; b) Provision of assets for emergency response: Selected communities in remote locations that are likely to cut off from their divisional offices maybe provided with boats and generators to manage their villages till they are reached with government assistance.

Costs for Recovery and Reconstruction

The costs for implementation of the above mentioned recovery strategies and policy is included in the Housing, DRR, Employment and Livelihoods, Trade & Industry and Gender sector chapters.

Assessment Methodology

The Human Impact Assessment is largely a qualitative assessment that examines the impact of the disaster on the affected families and their quality of life, specifically negative impacts that can result from the disaster such as malnutrition, migration, long term displacement, increase in gender based violence. It also seeks to understand the coping strategies and spontaneous recovery efforts of the people. The objective of the assessment is to identify such social issues and plan measures to improve quality of life, support community recovery efforts and enable them to be better prepared to manage the disasters and other crisis. Furthermore, the human impact assessments also consider issues of people's access to information, household level preparedness for disasters, their coping mechanisms, access to credit and disruption in community activities. The human impact assessment has also been used to gather information on people/ communities' priorities for recovery.

The Human Impact assessment looked at flood and landslides impacts on four broad categories of population: the urban households in the Colombo and Gampaha districts; the rural households in districts of Puttalam and Anuradhapura and the households affected by landslides in Kegalle district. In order to review the impacts of the floods and landslides on people, the following issues were identified:

- Housing
- Employment and Livelihoods
- Disaster Preparedness and Environmental impacts
- Gender and Social Inclusion
- Coping Strategies

182 *Housing, Land and Settlements Chapter*

- Recovery Assistance and gaps
- Recovery needs and priorities.

The above areas were identified in discussion with the PDNA core team, which include a gender expert, DRR expert, poverty expert, environment expert and government officials. It was agreed that for each category of population all these issues will be discussed with the affected communities and presented in the current chapter on human impacts.

UNDP undertook a series of FGDs and KIIs in the most severely affected districts to capture the impacts of the floods and landslides on the affected population. Field visits were undertaken to five of the six most severely affected districts[183] and discussions were held with the cross section of the people. These include men and women from affected communities, local Red Cross officials, NGOs, Government officials at the Divisional Secretariat and Grama Niladhari level. In addition to these field visits, UNDP commissioned a number of FGD and KII through Janathakshan, an NGO partner who has been actively supporting community development programmes since 2011.

The information collected through the FGDs and KIIs are qualitative in nature and focused on issues, which are considered of relevance for all sectors. The attempt was to capture issues that are relevant to people which require immediate attention. The premise is that such qualitative information may not be brought out by the sector assessment teams as the key focus of the sector chapters is to provide a quantitative estimate on the damages and losses and recovery needs.

Limitations : As mentioned above, this assessment is qualitative in nature and is not representative of the entire affected population but these are perspectives of a cross section of people that are in the most severely effected districts. The Information collected through the FGDs and KIIs were later corroborated by Civil Society and members of the national and international agencies in consultative meetings. The human impacts on people employed by the industries and companies in the Colombo and Gampaha districts was not available and will need to be done separately to support their recovery.

183 Colombo, Gampaha, Kegalle, Puttalam and Anuradhpura.

Part 2: Recovery Strategy

WP/Sri jaya/Meeth

Overview

The floods and landslides that occurred in Sri Lanka between May 14 to 29, 2016 affected 24 of the 25 districts, almost half a million people and all sectors of the economy. The disaster had a major impact on the urban areas of Sri Lanka, which has the largest concentration of economic activities and is a hub of services to the entire country. The rural poor who are dependent on agriculture were also hard hit, as were the fishermen living along the coastal areas of Puttalam. The people residing in plantations were also affected as houses and assets were destroyed by the floods.

This recovery strategy has been developed as a part of the PDNA and aims to provide the key guiding principles, the overall approach, the institutional arrangements and the capacities required to implement recovery.

It is recognised that the Government will lead the recovery and reconstruction efforts, however given the multi sectoral nature of recovery, the government invites the participation of the civil society members, national and international agencies, the private sector, faith based agencies and other associations to join the efforts in recovery. Recovery programmes must be based on the needs and priorities of people affected by the disaster; therefore the affected population will be engaged in all recovery programmes. The Government will create opportunities for active and meaningful participation of the communities through all phases of the recovery programme. Community driven recovery efforts are more sustainable in the long-term and have been shown to build local capacities.

The complexity of the recovery programme should not be underestimated, particularly because this flooding and landslides has made it urgent to relocate a number of families in landslide areas and those living on embankments and in river basins. To facilitate resettlement of families as well as restoration of all economic activities, a large number of activities will be implemented within a short duration and it will require substantive financial resources as well as technical capacities. The Government needs a coordinated effort by all ministries to reach the targets set out for recovery and reconstruction. The recovery and reconstruction will require an enforcement of existing legislations and regulations. It may also require an introduction of new provisions to facilitate quick execution of recovery. It must be recognised that any delays in recovery and reconstruction will lead to unplanned and self-recovery efforts by the affected population themselves, which will increase their exposure to future hazards and recreate similar flood and landslide risks as before. Recovery is time sensitive and therefore activities must commence immediately to avoid disaster of a similar scale in the coming monsoon season. It requires a strong political will, dedicated financial and human resources and close cooperation of the affected communities to undertake a successful recovery programme.

The PDNA proposes implementation of recovery in three phases, a short, medium and long term. The duration of short-term recovery is set for six months, the medium term recovery for six to eighteen months and the long-term recovery for eighteen months onward. These durations are aligned with the financial year of the Government for budgetary purposes. Each sector chapter of the PDNA presents recovery needs for short, medium and long term recovery including information on sector specific implementation arrangements. This chapter presents a broader strategy that will guide the overall recovery process.

Building a safer Sri Lanka

Sri Lanka has had long history of floods. Annual floods are common occurrences; and each flood has weakened flood protection systems. Rapid urbanisation, expansion of the trade and industries and service sectors in the urban areas has increased risks to floods. Climate change will lead to increased occurrences

of floods and landslides and other disasters.[184] The country has sustained huge economic losses from floods in recent years. The losses from floods in 2010 were US$ 105 million and for two floods events in 2011 was US$ 500 million.[185] Given the huge losses sustained in the recent years and in the current floods and landslides, the objective of the recovery and reconstruction efforts should go beyond addressing only the damages and losses of this flood: it should aim to address the longstanding and underlying risks that cause economic losses and loss of lives. These floods can be seen as a wakeup call. Therefore, it is time to make a concerted effort to reconstruct with the objective of protecting against future floods and to build a safer Sri Lanka.

The post disaster recovery context presents an opportunity to amend the 'development' errors made in the past that allowed for unplanned growth and investment. The resources and favourable policy climate in the recovery phase makes it possible to introduce changes that build resilience against future disasters. In Sri Lanka, this could be the opportunity to strengthen flood protection structures or even re-design such structures where necessary; relocate all families from landslide risk areas and flood plains; rebuild all damaged houses and public services to flood resilient standards; expand the coverage of insurance and social protection to most vulnerable groups; change policy to empower women and disadvantaged groups through joint titling of land, property and assets; and reinforce basic services to provide uninterrupted services and improve community preparedness to build disaster safe communities.

Sri Lanka has considerable experience in recovery and reconstruction. The country can draw upon the good practices of the 2004 Tsunami recovery (budget of US$1.6 billion) and the 2009 post conflict recovery (budget of US$ 3 billion),[186] particularly for reconstruction of houses and other damaged infrastructure. The GoSL has worked through the sector ministries, the military and closely with the international agencies, local NGOs to rebuild in past crises. Similar partnerships and coordination mechanisms could be established for recovery and reconstruction in these floods and landslides. The private sector can make a significant contribution to the reconstruction, as it has already shown an interest during the emergency relief phase.[187]

Guiding Principles

The recovery strategy will be guided by a number of principles aimed at improving the quality of recovery, emphasising equity and inclusion, and promoting risk reduction. These guiding principles are articulated below:

- Given the repeated economic losses of disasters, recovery should aim to reduce vulnerabilities to future disasters and build resilience of people. The aim is to build back better and safer through improvements in built assets, environment assets, preparedness of government and communities to manage disaster risks
- Recognising that resettlement is the only option for the landslide affected communities; the relocation undertaken will ensure that communities are adequately consulted in the design and construction of the newly planned settlements. Every effort will be made to facilitate a voluntary relocation of communities with adequate attention given to the facilitating social, cultural and livelihood activities in the new settlements

184 Source: Statement of Sri Lanka to 18 session of Conference of Parties (COP) to the United Nations Framework on Climate Change (UNFCCC), 2012

185 Source: Data from EMDAT Center for Epidemiology of Disasters (CRED)

186 Udaya, K.K.S. and Perera, K.E.D., 2013, Accelerating Inclusive Growth Trends in Sri Lanka: Challenges and Achievements

187 Refer to the "Disaster Risk Reduction" chapter

- Recovery should target the most vulnerable families, in the case of Sri Lanka, this would be the bottom 40 percent of the population and the near poor who are also living in risk areas and women affected by the floods and landslides. Recovery would adopt a more nuanced approach to increase the skills and asset base of the urban poor living in Colombo and Gampaha areas, the rural poor and on underserved in estate areas so that they are more resilient to future disasters
- Recovery interventions should be guided by gender equity and social inclusion with a specific orientation towards the most vulnerable. Recovery should follow a people-based approach, which encourages consultations with communities, utilisation of social networks, and reliance on local skills and knowledge. It should be culturally sensitive and environment-friendly
- Resources for recovery should be prioritised well, providing for reconstruction of households and recovery of livelihoods of families as well as reconstruction of critical infrastructure. The reconstruction of infrastructure will take into account environmental risks and will be done in a manner that will prevent further degradation of environment
- Recognising that the Local Governments play a major role in the planning and implementation of recovery, the Government will strengthen the capacities of Local Government authorities to implement recovery and reconstruction and carry out its mandate in preparing and mitigating measures to address flood and landslide risks
- Recovery should be implemented in a transparent manner and all the information related to recovery must be available in public domain and be widely disseminated, using means of communication that is accessible to the affected communities
- Recovery should be an inclusive and collective effort, using the resources and expertise of the Government of Sri Lanka, the civil society, the development partners and the private sector
- Recovery programmes should, to every extent possible, be done using locally available materials and using local capacities and skills

Policy Support

Given the multidimensional nature of the recovery process, there is an urgent need to develop guidelines/policies for the entire recovery and reconstruction process. These guidelines/policies will lay out the scope of the recovery assistance, the enabling mechanisms and procedures for delivering assistance and the role of the government and other partners in recovery. The guidelines/policy will also provide information on benefits to families who are outside the purview of the insurance schemes and are not eligible for compensation under the insurance. The guideline/policy will recognise the need for targeted assistance for children that are orphaned and women who were widowed in the landslides and floods. It will also articulate benefits for people with special needs. The recovery guidelines/policy will also elaborate on the institutional arrangements for recovery, the role of the lead ministry and other line ministries.

Guidelines for Disaster Induced Displacement

The Government of Sri Lanka does not have a clear policy for resettlement of people displaced due to both, natural and human-induced hazards. In general, the decisions of the Government on assisting disaster-affected people are taken case-by-case considering various aspects including the severity of the disaster. The Ministry of Resettlement has drafted a Framework for National Resettlement Policy targeting internally displaced persons due to the conflict, which is pending approval. However, there is no policy or guideline for disaster related displacement, although relocations have been undertaken post-tsunami and for landslides in the Badulla district.

The current floods and landslides have displaced over 27,000 families. These households will be resettled in new land. The Government will review the guidelines, circulars, insurance schemes, draft policy for resettlement of internally displaced people drawing on the draft policy developed by the Ministry of Resettlement. The new National Policy for Resettlement will guide the relocation of people living in high risk locations as well as those displaced due to disasters caused by natural and human induced hazards. This policy will provide provisions for addressing all issues related to acquiring of land, materials, design, all services including livelihoods in the new settlement. Decisions about ownership of land and houses will also be specified in the policy. The policy will lay out the scope of recovery assistance and enabling mechanisms and role of the government in recovery.

Institutional Arrangements for Recovery and Key Stakeholders

The GoSL will lead the recovery effort through the Ministry of Disaster Management or the Ministry of National Policies and Economic Affairs. It will coordinate with the line ministries, departments and Ministry of Provincial Council and Local Government to implement specific recovery programmes. The Government Agents in the districts and the Divisional Secretariat will coordinate the recovery at the district and divisional level. Local governments will play a critical role in implementing recovery interventions at the household and community levels. The capacities of the Divisional Secretary's and Grama Niladharis will be augmented to take additional responsibilities.

The Ministry of Disaster Management and or the Ministry of National Policies and Economic Affairs will be authorised to approve sector recovery plans and budget, and procure materials for reconstruction. It will work with the Ministry of Land, District/Divisional Secretaries to facilitate land acquisition for resettlement. The Ministries will work very closely with the concerned ministries and agencies in distribution insurance assistance and social benefits to people. The Ministries will also establish mechanisms to monitor progress of the recovery work and measures to address grievance of people.

As stated above, recovery will need the support of a large number of external stakeholders. It will include development partners, the civil society, the NGOs and the private sector. Since the private sector has sustained economic losses, the Government will work closely with the Chambers of Commerce and other private associations to ensure that all Industries and companies have a business continuity plan (BCP).

The Government will strengthen coordination mechanisms to facilitate the participation of the development partners, external governments, the private sector, NGOs and faith based agencies in disaster recovery and reconstruction. The Government will use the resources of the partners based on their comparative advantages and skills. The Government will seek technical expertise of development partners and private sector for specific tasks of reconstruction.

Communities will be the central focus of recovery; therefore they should be consulted in preparing and implementing all recovery programmes. The support of community-based organisations (CBOs) and local leaders shall be obtained in undertaking recovery programmes. Religious groups and leaders have played an important role in supporting disaster relief and management of camps, these local religious groups will also be consulted and invited to contribute to recovery.

Resource Mobilisation

The PDNA estimates the total recovery needs at LKR 139.1 billion (US$ 0.96 billion). The entire amount will be required over the period of four to ten years[188] and could be a part of the annual budget allocations of the national government. The recovery takes into account the cost of reconstruction with higher standards, improved services, push for enforcement of regulations and disaster and environmental risks. Therefore, the recovery needs are significantly higher than the damages and losses in several sectors.

The Government will make a decision on the source of funding for recovery. The PDNA presents a list of urgent and priority needs as well long term needs that include measures to protect infrastructure from floods and landslides, not just replacement or repair of affected infrastructures. A more detailed recovery prioritisation process will be undertaken to decide on a sector-by-sector itemised list of priorities. This process will help the Government plan the use of its resources. An incremental approach could be taken to fund large-scale reconstruction and resilience building projects. The Government can fund recovery in the following ways:

- Insurance for housing reconstruction and asset replacement.
- Budgetary reallocations from on-going programmes.
- Special allocations from treasury for recovery.
- Use the Cat DDO for large infrastructure projects and loans from IFIs.
- Grants from multilateral and bilateral agencies.
- Contributions from private sector.

In 2016, the Ministry of Finance contributed to an insurance policy from National Insurance Trust Fund to cover individual household and small business property damages up to LKR 2.5 million. The total insurance coverage is LKR 8.5 billion for houses and small business properties.

The implementation of recovery will take place over a 3-year period and therefore the flow of funds can be organised accordingly. A larger proportion of funds will be required to meet the urgent needs in the next six months and the year following it but also funds in the second and third years to continue the resettlement of families.

Donor Assistance

To facilitate donor assistance, the GoSL has opened several bank accounts. To facilitate local donations from Sri Lanka, a “Disaster Relief Fund” has been set up with two bank accounts in the Bank of Ceylon. One of the accounts (AC No 7040171) is managed by the MDM and the second account (AC No 7042793) is managed by the Ministry of Finance. To facilitate foreign donations, separate accounts for five types of foreign currencies have been opened at Sampath Bank by the Central Bank of Sri Lanka. These funds are expected to be utilised for meeting the immediate recovery cost of the disaster and will supplement the disbursements expected from the insurance policy.

188 *Although the recovery is set until end of 2020, the actual implementation may take longer due to the housing relocation planned.*

Geographical Coverage

The recovery programme would be implemented in all the 24 affected districts of Sri Lanka, but will focus on the six most affected districts of Colombo, Gampaha, Kegalle, Ratnapura, Puttalam and Anuradhapura. These districts were selected based on the severity of the flood and landslide impacts taking into account days of inundation, number of people affected, deaths and losses in business. It is understood that several GN divisions in other districts were affected by the floods and recovery will also be undertaken in those districts.

Time Frame

The time frame for the implementation of floods and landslides recovery is at least four years for all sectors, except housing. Resettlement of housing will continue beyond this period due to the large number of families that are to be relocated in the landslide affected areas, as well at the families living in encroached lands whose houses were also damaged by the flood. These families would need full resettlement, with land acquisition and construction of houses and all basic services in the new site.

Areas of Recovery

The PDNA covers 13 areas, which have been grouped under four categories: productive, social, infrastructure, and cross-cutting themes. Recovery will emphasise the following areas:

Housing Reconstruction and Relocation : Housing is the largest sector and the most important area of recovery. A total of 58,925 housing units across 25 districts were damaged, of which 6,382 were fully damaged, 25,958 housing units were partially damaged and 26,585 units suffered minor damage.[189] The total recovery cost of the housing sector is estimated at LKR 122 billion. Housing will be constructed and repaired in a phased manner. The following strategies will be adopted to undertake housing reconstruction in the medium and long term in order of priority are as follows:

- **In-situ repair and reconstruction** of 29,621 minor and partially damaged housing units and 1,654 fully damaged housing units (including replacement for minor damaged and partially damaged improvised housing) in low-risk areas. The reconstruction cost for in-situ reconstruction is estimated at LKR 27.5 billion.
- **Relocation** of 2,361 houses affected by landslides inclusive of 1,682 units in Kegalle District, and the Estate sector (1,862 units inclusive of those included in the Kegalle District) to low landslide risk areas. The reconstruction cost for relocation of landslide-affected households is estimated at LKR 5.8 billion, inclusive of the cost of land, settlement planning and land preparation and house construction.
- **Relocation** of 25,289 flood affected housing units located in reservations and buffer zones of the Kelani river basin in urban and peri-urban areas of Colombo and Gampaha Districts. The cost of reconstruction in relocated sites is estimated at LKR 77 billion, which is equivalent to 70 percent of the total housing reconstruction cost. This may be addressed through long-term Development Programmes of GoSL.

Housing reconstruction will adopt different methodologies as per the reconstruction context, and different stakeholders will be involved in implementing reconstruction programmes in each situation. As per the Cabinet Decision taken on August 2, 2016, the National Building Research Organisation will provide the technical assistance in terms of issuing land clearance certificates and providing type plans for housing construction considering the characteristics of the land.

189 *Source: NDRSC, 2016*

In-situ reconstruction : The owner driven housing methodology widely implemented in Sri Lanka in post-tsunami and post-conflict reconstruction programmes will be adopted for in-situ reconstruction in low risk areas. It is estimated that the National Natural Disaster Insurance Policy will cover a major portion of reconstruction costs, which may be supplemented by concessionary loans from state banks specialised in housing finance (SMIB, HDFC) and the National Housing Development Authority. Technical supervision and monitoring may be provided by the respective Divisional Secretariats and local authorities, who will need to ensure that construction meets minimum stipulated standards and conforms to respective building codes of the Urban Development Authority in urban areas, or the Housing and Town Improvement Ordinance and the relevant Pradeshiya Sabha in rural areas. The construction duration to complete in-situ relocation is estimated at 2 years.

Reconstruction for landslide affected communities : Landslide-affected communities outside the estate sector would have the choice of voluntary relocating to land of their choice situated in low risk areas, through provision of a land grant of LKR 400,000 to purchase and prepare land. Housing reconstruction will be implemented through the owner driven methodology under the supervision of the respective Divisional Secretariats and local authorities of the relocated locations. Households not willing to relocate on their own and those in the estate will be assisted through a government facilitated relocation programme. These families will be relocated to green field sites, which will be developed through settlement planning and land preparation to reduce the impacts of future disasters. Relocation to green field sites is a costly process as current programmes indicate that physical planning and land preparation costs are in the range of LKR 120,000 per housing unit. The construction may be implemented through community driven or contractor driven methodologies.

Improved basic services, including Health and Education services : The focus of the recovery in health and education services will be to provide uninterrupted services during and after the disaster. Keeping in mind the need to prevent further damage to schools and hospitals, some of the services will be relocated to safer sites. Disaster preparedness measures will be scaled up to enable the health services and schools to respond to emergencies. With a view to strengthening the medical supply chain, a warehouse with supplies and chest clinic located in high-risk zone of Kegalle will be relocated. The Ministry of Health will undertake this new reconstruction. Similarly, Education ministry will relocate eight schools that are currently located in high-risk areas and will strengthen disaster preparedness and response at the school and community level through school-based/community based DRM training and planning.

Restoration of Trade and Commercial activities, Agriculture and Livelihoods Assistance : The Trade and Commercial activities are privately owned, several companies have already resumed production, while others are conducting necessary repairs. The recovery costs of the companies are likely to be higher than the insurance pay out and losses will continue till full production capacities are restored. The role of the government in restoration of commercial activities is limited, however given the impact of the economic loss in this key sector of the economy, the government will encourage each registered company to develop BCPs for floods and other disasters and introduce mitigation measures to prevent damage to equipment. Employees can also be trained in disaster preparedness. The Government will seek the support of the Chambers of Commerce to start these initiatives.

In the Agriculture sector, assistance will be given to small and medium farmers for replanting both, paddy and other food crops including fruit plantations. Cash grants and insurance payouts will support families to buy livestock, particularly poultry. The Government will invite international partners to support livelihoods recovery of small businesses that are not covered under insurance schemes. The losses in the informal sector are unaccounted for in the flood and landslides due to the lack of data. Government Agents (GA) in Colombo, Gampaha and Kegalle have undertaken extensive household surveys, which could not be analysed in time for the PDNA. The data available from the survey will be compiled and analysed to develop

a profile of the informal sector and plan their recovery. Additional funds and capacities will be given to the Government Agents in these three districts to complete the survey. This will be one of the first priorities of the Government to support the informal sector. International agencies will be invited to support this group of people.

Infrastructure : Reconstruction of damaged infrastructure such as roads, irrigation structures, water and sanitation facilities will be undertaken by the respective line ministries and provincial councils. The reconstruction will aim to have a robust infrastructure, which can provide continuous services during the floods and landslides. Repair of roads and power supply will be attended to immediately and irrigation structures repaired and strengthened in the medium and long term. The line ministries will undertake the repair with their relevant technical staff.

Disaster Risk Reduction : One of the key commitments made in the PDNA and recovery strategy is to replace damaged infrastructure with stronger and more resilient structures that withstand future disaster impacts. The commitment to "build back better" implies improvements in the structural integrity of the buildings as well as improved systems to provide uninterrupted services to people during disasters. To ensure that these principles are integrated into the recovery and reconstruction, the Ministry of Disaster Management will develop short checklists for each sector to support integration of structural and non-structural measures in all reconstruction and recovery programmes. It will develop guidelines for preparedness plans for the industries and companies, and facilitate disaster preparedness in schools and hospitals and checklists for structural measures in all public buildings. Additionally, the National Building Research Organisation will closely with the Ministry of Housing and Construction to undertake quick risk assessments of the areas allocated for relocation of Kegalle landslide affected families and help in identifying "low risk" areas for resettlement of other communities.

The Government will use recovery as an opportunity to strengthen DRR systems; in particular it will focus on improving information management systems to support assessment, relief distribution, early warning and monitoring risks. Other areas of work include strengthening early warning dissemination, establishing community preparedness plans, reinforcing flood forecasting and prediction, conducting flood risk assessments and expanding social protection systems and insurance coverage for most vulnerable households.

Environmental Protection: The recovery and reconstruction process will take an environmental sensitive approach to build back better. It will ensure that all reconstruction of infrastructure and housing is done by adhering to land use regulations appropriate to the area. An environment impact assessment will be undertaken for all large infrastructure reconstruction. Regulations related to land use in environment sensitive areas such as the Kelani river and Deduru Oya bank reservations will be transformed into protected zones or public areas that will support sustainable land management. Similarly, lands that will be released due to relocation of communities in high risk landslide risk zones will be stabilised and made available for controlled cultivation with restricted activities. Protection of wetlands, biodiversity areas will be a priority and the national parks that were affected by the floods will be required to develop a disaster preparedness plan.

Operationalising the Principles of Recovery

Gender, social inclusion and focus on the most vulnerable : One of the guiding principles of recovery is that it focuses on the most vulnerable. In Sri Lanka this includes two categories of poor: people, who live below the poverty line of LKR 4,132.00[190] a day, and a second category, of a much larger group of people, who are just above the poverty line, but at risk of sliding back due to effects of this flood and landslides.

The programmes of livelihoods restoration, housing reconstruction will target these people. Among this group and outside this group are single women, female headed households, and people with disabilities that need quick support to stabilise their lives. If possible, some support may be extended to families to pay off their earlier debts or credit taken after these floods from private moneylenders, which in some instances had an annual interest of 36 percent.

Under the leadership of the local government, Divisional Secretaries and Gram Niladharis with the support of local NGOs and international agencies will identify the most vulnerable and implement livelihoods support, which can range from cash grants to asset replacement; skills training; access to credit; registration of businesses; insurance coverage; and including all vulnerable households under the Samurdhi schemes. Similar filters will be applied to housing reconstruction programme to give priority to most vulnerable people. Unless there is a legal impediment, all asset replacement and house ownership done during relocation will be given under a joint ownership scheme.

Transparency and accountability in implementation : The Government will launch recovery and reconstruction of houses through the dissemination of information on recovery programmes to all affected communities. A communication strategy that will use social media, government websites, bill boards and flyers/leaflets on various recovery programmes will be launched. A separate flyer for housing reconstruction will be developed to communicate the type of assistance for the various categories of housing, the application process for accessing the benefits and the office responsible for disbursement of the assistance will be provided. The Government will set up monitoring mechanisms from Grama Niladhari level to the national level to track the progress of recovery. As soon as possible, indicators to monitor the progress of various recovery programmes will be developed to keep track of and review implementation of programmes. Site-visits, quarterly reports and monthly meetings will take place at the DS level to keep track of progress. The websites of the Ministry of National Policies and Economic Affairs and the Ministry of Disaster Management will be regularly updated with the quarterly progress reports by districts.

As with all large recovery programmes, the government will undertake its own internal audit and third party audits of the recovery programme. Additionally, NGOs may also assist in conducting social audits through communities.

Addressing community grievances : To address the complaints of communities, the government will set up a grievance redress mechanism at district level using already existing committees, which represent a cross section of people. People will also have direct access to the MDM and National Policies websites to register their grievances. However, to the extent possible, these mechanisms will be as close as possible to the affected people.

Capacity Building of local Government officials : The major share of implementing and coordinating recovery programmes will fall on the shoulders of the local governments. Housing reconstruction and livelihoods assistance will be the two areas that local government officials will manage. The Government will try as a first measure to fill all vacancies in the most affected districts and hire additional short-term staff

190 Department of Census and Statistics. 2016, District official poverty lines.

to support the implementation. Furthermore, the government will seek external technical expertise through international agencies; private sector and the Sri Lankan professionals will provide specific technical personnel such as engineers, Information Technology experts, and finance experts to support the recovery.

Prioritising and Sequencing Recovery Needs

In view of the very large portfolio of recovery needs across the sectors and the districts, the recovery needs for each sector has been prioritised into short, medium and long term needs. A quick comparison of the recovery needs across sectors reveal that a number of sectors have included most needs in the short term. It will be challenging to implement all the needs within a short time without the necessary institutional framework, administrative procedures and policy framework to organise recovery. Therefore, it is important to set the overall priorities for recovery across all sectors even as institutional and policy framework and guidelines for recovery is being developed. The criteria for prioritisation are based on few important considerations. Recovery interventions in the short term will aim to stabilise the communities and create conditions for spontaneous recovery. Recovery interventions undertaken in the medium term will aim to restore normalcy by supporting full socio-economic recovery of communities. Recovery interventions undertaken in the long term will aim to build community resilience, build capacities to address risks and strengthen systems and infrastructure to withstand future disaster impacts.

Short-term recovery interventions to stabilise communities could include the following:

- Continued support to families living in temporary camps and evacuation centres.
- Facilitate the resumption of all basic services including health, education and necessary services through the local government offices to improve civic amenities and help restore normalcy in communities.
- Emergency employment through cash for work, cash grants for replacement of livelihood assets and loans for restarting small businesses, prioritising household businesses, home gardens and enterprises owned and managed by women.
- Seeds and supplies to farmers, inputs to fishermen, cash grants for replacement of lost livestock, including poultry.
- Oversight and support to resume full production capacities in all the trade and industries in Colombo and Biyagama Export Processing Zone.
- Repair of roads, irrigation structures, canals and other infrastructure to support quick resumption of agricultural activities.
- Release of funds for repair of damaged houses and replacement of household assets.
- Urgent community preparedness and awareness for the next flooding season.

The medium term recovery interventions to facilitate full socio-economic recovery could include the following:

- Provision of transitional shelter for landslide affected communities to support stay till relocation process is completed.
- Development of guidelines for disaster induced displacements and detailed plans for relocation of all households.
- Loans for micro and small businesses; vocational training, registration of businesses and insurance coverage.
- Replacement of agricultural tools and machineries and repair of all agriculture infrastructures, including small scale irrigation facilities and fish tanks.
- Repair of all infrastructure including schools, health services, roads and irrigation structures

- Community-based disaster preparedness and enhancing risk awareness in most vulnerable villages.
- Strengthening local level elements of early warning systems, emergency response systems at national and local levels, information management systems.

The long-term activities to address disaster and environmental risks and build resilience could include the following:

- Livelihoods diversification through technical skills training focusing on masonry, plumbing, electricity, carpentry and other skills.
- Restoration of degraded watersheds and mangroves in the flood affected regions.
- Relocation of landslide affected communities and communities in the encroached lands in Kelani river basin and other areas around Colombo and Gampaha districts.
- Addressing environmental risks including solid waste management in the urban areas.
- Developing business continuity plans for all trade and industries and disaster preparedness plans for national parks.
- Enforcing regulations on development in the flood plains, control riverbank erosion by strictly implementing laws on prevention of sand mining and using appropriate bank stabilisation measures.
- Increasing coverage of social protection schemes and insurance to vulnerable households.
- Strengthening disaster preparedness capacities of all sectors and ministries and establishing fail-safe mechanisms to provide uninterrupted services during disasters.

Way forward

In order to kick-start the recovery process, the MDM and Ministry of National Policies & Economic Affairs (MNPEA) expect to submit the PDNA report together with recovery strategy for approval of the Cabinet of Ministers through the Cabinet Sub-Committee on Economic Management. The findings will also be presented to H.E. the President, who is the Chairman of the National Council for Disaster Management, which is the apex body on disaster management of the country. In terms of next steps, the Government will undertake a short exercise to prioritise the recovery programmes for the short, medium and long-term interventions and develop a recovery plan for each districts for all the sectors affected. With this plan in hand, the Government will undertake a detail assessment of all the houses that are to be reconstructed and survey of needs of the informal sector.

Concurrently, draft guidelines for recovery will be developed through a consultative process and finalised. Resource mobilisation through insurance and government sources is already initiated. The plans for project approvals, disbursement of funds, procurement of goods and materials will be established.

A quick assessment of the capacity gaps in the affected districts will be undertaken to ensure that staff vacancies for key positions are prioritised and filled and additional capacities are sourced as per needs.

It has been identified in the PDNA that many agencies have already restored their services, but challenges will remain in a number of key sectors including housing, health, and industry and commerce. Therefore, the two ministries, MDM and MNPEA have realised the importance of developing a Recovery Framework and recovery plan for the post disaster recovery and rebuilding in order to minimise future risks in the areas affected by floods and landslide disasters. The Ministries will take a lead role in developing the recovery framework with the support of relevant agencies and sector Ministries.

Individual sector agencies and Ministries will have to take the lead role in identifying the recovery actions and developing proposals for National Planning Department's approval. The Ministry of Disaster Management and agencies under the purview of the Ministry (i.e. Disaster Management Centre, National Building Research Organisation) will provide technical inputs in order to reduce the future risks to specific sectors where necessary. All approved projects should be uploaded by respective implementing agencies to the on-line disaster risk reduction monitoring system developed by the Ministry of Disaster Management and the progress will be monitored through the Steering Committee of the Sri Lanka Comprehensive Disaster Management Programme, with the support of Project Management & Monitoring Department. Quarterly progress will also be provided to the Presidential Secretariat and Prime Minister's office by the Ministry of Disaster Management.

The government will also enhance coordination with private sector, NGOs and international agencies to supplement the Government's efforts in recovery by strengthening the National Disaster Management Coordination Committee (NDMCC)

Annexes

Annex 1. PDNA Sector Teams and Contributors

Disaster Risk Reduction including Urban Risks

Lead Ministry
Ministry of Disaster Management: Anoja Seneviratne

Co-lead Agency
UNDP: Hossein Kalali, U. W. L Chandradasa, Sureka Perera

Further Contributors
R.M.S. Bandara (Director, NBRO), P. Hettiarachch (Director of Hydrology, Ministry of Irrigation), Watsala Jayamanna (DRR/ERP Policy Consultant, UNICEF), Chaminda Pathiraja (Senior Assistant Secretary, Ministry of Disaster Management), Shiromi Jayawardena (Deputy Director, Department of Meteorology)

Education

Lead Ministry
Ministry of Education: Pushpa Wijesooriya

Co-lead Agency
UNICEF: H. R. Mohamed Shibly, Christian Stoff

Further Contributors
P.A.S.P. Jayalath (Assistant Director, Ministry of Education)

Employment and Livelihoods

Lead Ministry

Co-lead Agency
ILO: Abdul Razzak Farzan, Vishaka Hidellage, Buddika Hapuarchchi

Further Contributors
Dong Lin Li (Country Director, ILO Office for Sri Lanka and the Maldives), Indra Tudawe (Senior Programme Officer, ILO Office for Sri Lanka and the Maldives)

Environment

Lead Ministry

Co-lead Agency
UNDP: Nishanthi Perera, Visaka Hidellage

Further Contributors
Dr. Prasanthi Gunawardena (Senior Lecturer, University of Sri Jayewardenapura), W. A. H. Wijeratne, Ministry of Sustainable Development and Wildlife), Nalin Mannapperuma, (Director, Waste Management Authority-Western Province), Athula Illangasinhe (Director, Ministry of Provincial Councils and Local

Movements), Nihal Ekanayake (Public Health Inspector, Kolonnawa Urban Council), Himali Karunaweera (Assistant Director, Central Environment Authority), Rohan T. Cooray (UNDP), H.M.R.N. Hearath (Disaster Management Relief Officer, Ministry of Disaster Management), Nandana Rajapaksha (Gramasewa Niladari, 2969 Nariyagama North), U. Karunaratne (Gramasewa Niladari, Thambapanni)

Food Security, Agriculture, Livestock, Fisheries

Lead Ministry
Ministry of Agriculture: Madhusha Weerakkodi

Co-lead Agency
FAO: Madhawa Hettiarachchi, WFP: Laksiri Nanayakkara

Further Contributors
Danielle Barelli (FAO), Ralph Van Doorn (Senior Economist, World Bank), Dr. A. de Silva (Director, Natural Resources Management Center), Dr. H.K.K. Kadupitiya (Research Officer/Head, Natural Resources Management Center), Stanley Perera (Director, Socio Economics and Planning Centre), R.K.W. Ranketh Kumara (Assistant Director, Department of Export Agriculture), Dineth Prabash (Assistant Director, Department of Export Agriculture), Bharatha Ramanayake (Director-Planning, Ministry of Fisheries and Aquatic Development), Wasantha Liyanage (Regional Director-WP, Ministry of Industry and Commerce), J.M. Ridma Jayasundara (Assistant Director, Ministry of Industry and Commerce), Anton Perera(Director, Ministry of Industry and Commerce), Dr M.I.G.Jayathilaka (Veterinary Surgeon, Ministry of Rural Economic Affairs-Livestock), W.H.D.Priyadarshana (Head-Marketing, Hector Kobbekaduwa Agrarian Research and Training Institute), A. Z. J. Singarayer (Senior Engineering Assistant, Department of Agrarian Development), L.B.B.S. Miranda (Assistant Director, Department of Agrarian Development), Sampath Manthrinayake (Director, Ministry of Plantation Industries)

Gender and Social Inclusion

Lead Ministry
Ministry of Women and Children's Affairs: Chandini Peris

Co-lead Agency
UN Women: Cecilia Aipira, Rose Kyusun Chung, Raamaya Salgado

Further Contributors
National Child Protection Authority, Paula Bulancea (UNICEF Sri Lanka), Mihlar Mohammad Abdul Malik (UNICEF Sri Lanka), Lara Perera (UNICEF Sri Lanka), Hyshyama Hamin (UNFPA Sri Lanka)

Health

Lead Ministry
Ministry of Health: Dr. Janaka Wickramarathne, Dr Asanka Wedamulla

Co-lead Agency
WHO: Dr. Sugandhika Perera

Further Contributors
Brigadier Priyantha Senaratne (Director Operations, Sri Lanka Army)

Housing, Land and Settlements

Lead Ministry
Ministry of Housing and Construction: M.A.P.I Karunasekara

Co-lead Agency
UN-Habitat: Keiko Matsuo

Further Contributors
National Building Research Organisation, Tim McNair (Chief Technical Advisor, UN-Habitat Sri Lanka), Aziza Usoof (Monitoring and Reporting Manager, UN-Habitat Sri Lanka), Ministry of Hill Country, New Villages, Infrastructure and Community Development, Ministry of Plantation Industries, Ministry of Land, Ministry of Megapolis and Western Development

Human Development Impact

Lead Ministry

Co-lead Agency
UNDP: Rita Missal

Further Contributors
Janathakshan (NGO partner), Lara Perera (UNICEF), David Newhouse (World Bank), Kyusung Chung (UN Women), Keiko Matsuo (UN Habitat), Aziza Usoof (UN Habitat)

Irrigation

Lead Ministry
Ministry of Irrigation: Janakie Meegastenna (Director-Drainage and Flood Control Systems, Irrigation Department)

Co-lead Agency
World Bank: Suranga Kahandawa

Further Contributors
Shiromi Weeraratne (Irrigation Engineer, Irrigation Department), Prabath Witharana (Director, Department of Agrarian Development), Nihal Fernando (Consultant, World Bank)

Power Supply

Lead Ministry
Ministry of Power and Energy: Anuradhi Perera

Further Contributors
Mahinda Wijeshantha (Deputy General Manager, Ceylon Electricity Board)

Industry and Commerce

Lead Ministry
Ministry of Industry and Commerce: Anton Perera, Ceylon Chamber of Commerce: Chandrarathna Vithanage

Co-lead Agency
World Bank: Sriyani Hulugalle
UNDP: Buddika Hapuarchchi

Further Contributors
Sachi Perera (UNV), Senel Wanniarachchi (UNV), Dinesha Samaranayake (Consultant, World Bank)

Transport

Lead Ministry
Ministry of Highways and Higher Education: S.D.S. Deshapriya (Road Development Authority)

Co-lead Agency
World Bank: Amali Rajapaksa

Further Contributors
Pushpani Amarathunga (Assistant Director-Planning, Ministry of Higher Education and Highways), Thilakarathna Banda (Additional Secretary-Planning, Ministry of Transport and Civil Aviation), Channa Dias (Assistant Director-Planning, Ministry of Transport and Civil Aviation), Suranga Kahandawa (Disaster Risk Management Specialist, World Bank)

Water and Sanitation

Lead Ministry
National Water Supply and Drainage Board: Sumitha Sumanaweera
Ministry of City Planning and Water Supply: H. M. J. Herath

Co-lead Agency
UNICEF: Suranga De Silva

Further Contributors
Nisansala Waidyaratne (Assistant Director-Development, Ministry of City Planning and Water Supply)

Macro-economic impact

Lead Agency
World Bank: Ralph Van Doorn

Annex 2. Terms of Reference

Post Disaster Needs Assessment (PDNA) Scope and Methodology

I. Background

A low pressure zone above Sri Lanka caused torrential rainfall all over the country from May 14, 2016 onwards, and in some places it was the heaviest recorded rainfall in more than 18 years. Several locations including Kelani, Kalu, Mahaweli, Deduru Oya, Yan Oya, Maha Oya and Attanagalu Oya observed rising water levels which caused widespread flooding. Heavy rainfall was recorded in Deraniyagala (355.5 mm) Colombo (256 mm), Katunayake (262mm), Ratmalana (190mm), Mannar (185.5 mm) and Trincomalee (182.4 mm). Further, districts such as Kurunegala, Kegalle, Nuwaraeliya, Ratnapura, Kalutara, Kandy, Puttalam, Batticaloa and Anuradhapura also received more than 100 mm of rainfall. As a result of the rainfall, severe landslides were reported in several divisions (divisional secretariat) in Kegalle district. The worst mudslide was reported in Aranayake division in Kegalle district where three villages were completely covered by a mudslide. These are reportedly the worst floods in 25 years, with further heavy rains and flooding likely as the monsoon season continues.

As per the situation report issued by the Emergency Operation Centre (EOC) of Disaster Management Centre (DMC) on May 25, 2016, 22 districts out of a total of 25 districts countrywide were affected by landslides and flooding. A total of 102 deaths have been recorded while 100 people are missing. Approximately 237,065 (59,761 families) are affected by floods and landslides. District Secretaries have established 602 safe centres to house up to 64,000 people evacuated from inundated areas and unsafe locations in landslide prone districts. As water recedes the safe centres have reduced to 250, and the number of people remaining in these centres has now reduced to 61,859. About 558 houses are reported to be fully damaged and 4,312 houses partially damaged by floods and landslides.

II. Government Response and general coordination

The DMC has initiated search and rescue operations with the assistance of the Armed Forces and Police to rescue people stranded on roof tops and isolated locations. The District Secretaries have established 602 safe centres to house 64,000 people evacuated from the inundated areas and unsafe locations in the landslide prone districts. The National Disaster Relief Services Centre of the Ministry of Disaster Management (MDM) is coordinating with the District and Divisional Secretaries to provide cooked food to people in safe centres. A number of NGOs, voluntary organisations and the media are supporting the Government in providing and distributing relief items. Since many people are stranded or trapped in their houses which are either inundated or surrounded by water, the distribution of relief items is highly challenging.

A Special Presidential Task Force (PTF) appointed to look into the current disaster situation met on May 23. The PTF reported that the actual number of population affected in the Western Province is likely to be at least one third higher than the official estimate of 198,514 since many people, especially the middle class has opted not to be evacuated and are either staying with friends or family or in makeshift locations, rooftops or above the ground floor of inundated houses. Most of the affected population in the safe centres are from the urban poor, especially those who settled along the Kelani river basin and related water ways in urban areas such as Kolonnawa, Sedawatte etc. The PTF recommended the removal of all illegal houses blocking water ways and relocating around 1,000 affected families.

The PTF also estimates that thousands of small businesses, mainly in Colombo, have been severely affected, and their recovery is doubtful, thereby threatening the state of the local economy. With the threat of more landslides in the central hills in Nuwara Eliya, Matale, Kegalle, Kandy and Ratnapura districts, the PTF also recognises the need for immediate evacuation and long overdue relocation of communities to more suitable alternative locations.

III. Request for assistance for the PDNA

On 27 May 2016, the Ministry of National Policies and Economic Affairs (MNPEA), Government of Sri Lanka, sent a letter to the UN Resident Coordinator requesting support to conduct a PDNA. The assessment will be led by the Ministry of Disaster Management (MDM) and will be undertaken with the assistance of the European Union, the World Bank, United Nations agencies, and other relevant agencies and partners.

IV. Objectives of the PDNA

The PDNA will be an assessment of the impact of the floods and landslides in the 22 affected districts in Sri Lanka with a special focus on the most vulnerable communities, particularly the low income urban areas of Colombo and the central provinces of the country that were affected by the landslides.

The main objectives of the PDNA are to:

1. Estimate the overall impact of the 2016 floods and landslides on the socio-economic development of the country and of the affected districts and most vulnerable communities (those affected by landslides, and communities from low income settlements in Colombo) in particular
2. Assess the physical and human impacts of the disaster in order to develop a Recovery and Reconstruction strategy (RRS) presenting the early, medium and long term recovery and reconstruction strategy with an emphasis on the most vulnerable (communities in low income urban settlements in Colombo and in central hills at risk from landslides) with costs and a timeline in one consolidated report
3. Ensure that strategies for recovery integrate concepts of disaster risk reduction, including “build back better”, identify underlying causes for the scale of the damage (noting that land degradation and land use planning, or absence thereof, are important factors), and address gender and environmental concerns
4. Provide recommendations for strengthening strategies for flood risk management and landslide management in the country
5. Assess the status of the most vulnerable communities; those affected by landslides in central hills and communities from low income settlements in Colombo
6. Recommend institutional mechanisms and policy options to be undertaken in support of the recovery and reconstruction process and that promote long term disaster resilience with a special focus on landslides
7. Provide a strategy for the relocation of families illegally occupying and blocking waterways in the Kelani river basin
8. Provide suggestions to help strengthen the capacities of the Ministry of Disaster Management including the Disaster Management Centre

On June 8, 2016 the Government of Sri Lanka declared a state of disaster in 6 provinces (Western, North Western, Central, North Central, Sabaragamuwa, Uva) in Sri Lanka, using provisions under the Sri Lanka Disaster Management Act No. 13 of 2005, Article 1. Article 11(2) states that such Proclamation

will come into force on the date it was made (in this case by June 8, 2016) and will remain in force for a period of 2 months from the date of the making of the Proclamation. The Proclamation can be extended, if necessary, for further periods not exceeding 2 months at a time with the endorsement of the Parliament. Proclamation also automatically activate institutional emergency plans including National Emergency Operation Plan (NEOP).

V. PDNA Deliverables

One report comprised of the following:

- An impact and needs assessment for each selected sector (sectors to be decided in consultation with MDM, MNPEA and relevant sector ministries)
- A recovery and reconstruction strategy for the early, medium and long term needs with guiding principles, costs and timelines for each sector
- Recommendations for strengthening strategies for flood risk management and landslide management in the country

VI. Coordination of the PDNA

The PDNA exercise will be led by the Government of Sri Lanka: The Ministry of Policy Planning and Economic Affairs, Ministry of Disaster Management. The ministries will be supported by Heads of Agencies/Representatives from the United Nations (UN), the World Bank (WB) and the European Union (EU) to provide overall guidance for the PDNA. A PDNA Coordination Team with representatives from the Government and the three partners (UN, World Bank and EU) will be constituted to provide technical support and oversight to the PDNA process. A detailed description of these coordination structures can be found in Annex I.

VII. Methodology summary

The PDNA includes the collection of pre-disaster baseline data to compare with post-disaster conditions in order to evaluate the disaster impact and to determine the overall recovery strategy. The PDNA does not use a single methodology but a range of analytical methods, tools and techniques that have been developed and are applied to post disaster assessments and recovery planning by the UN, EU, and the World Bank, as well as other relevant stakeholders, including governments, non-governmental organisations and academic institutions. As such it combines quantitative data with qualitative information and analysis to assess the impact of the disaster and develop a recovery framework.

The assessment will build on secondary data available from State and Local Governments and from existing or on-going humanitarian/sectoral assessments which could be complemented by primary data such as the rapid humanitarian assessment and the agricultural assessment. Data will be collected by a combination of multi-sector field assessments, desk reviews, aerial reconnaissance, site visits by sector specialists, satellite imagery interpretation and interviews with stakeholders.
The assessment will have the following phases:

1. Training-A 2-day orientation training for Government and Districts officials will take place mid-July to share and explain templates in particular, so that baseline construction commences and damage data collection is done based on the requirements of the templates
2. Preparatory and Desk Review Phase-including initial desk reviews to collect baseline information, determine the scope of the respective sector-wide reviews, identify information gaps, prepare data collection templates, and identify and rapidly hire field data collection consultants. To begin with, desk reviews will be carried out to analyse and compile all available baselines information for the

various sectors, to identify gaps in baseline data, and to also identify various data sources for the collection of both baseline and damage data

3. Damage mapping-Based on available remote sensing techniques or where possible drone technology, geographical mapping of the extent of the floods and the consequent damage will be undertaken
4. Analytical Work and Sector Strategic Reviews-When most of the damage data is available, sector teams will be mobilised to visit the affected areas to consult with State and local government authorities, public/community representatives, NGOs, UN agencies, and other stakeholders, as well as examine the extent of the damage. The teams will subsequently review the data provided by the government to assess the extent and quality of data available. This will be followed by review and analysis of the data by sectoral/core teams to prepare the draft sector reports. The Macro-economic and Human development expert team will then aggregate the sector specific results into the macro-economic analysis and human development impact and write-up
5. Final consultations and Report writing-On completion of data collection and analysis, the sector teams will write sector reports and consultations with key stakeholders will be held to prioritise recovery strategies and costs. Other details work like ensuring that cross cutting issues are addressed and double counting is avoided will be also be taken care of
6. Consultations for validation of Recovery and Reconstruction needs
7. Presentation of findings and Final Report dissemination

VIII. Time frame for the Assessment

Activity	Completion Date
Identify and mobilise sector teams	July 15 onwards
Training on PDNA and RS methodology	July 18-19
Desk review to compile and analyse information on past, currently underway and planned assessments relevant to floods and landslides	July 20-22
Data collection and field visits	July 23-25
Data analysis and initial findings of disaster effects (Damage and Loss Tables)	July 25
Plenary with national government to discuss damage and needs figures	July 27
Developing the Recovery needs and strategy	July 28-29
Meeting with Senior Government officials on Recovery needs	July 29
Draft sector reports submission	August 1
Finalisation of the sector reports with annexes	August 3
Macro and Human Impact Assessment	August 4
Presentation of initial findings to the National Government	August 5
Presentation of full report to the national Government	September 15
Printing and dissemination of full report	September 30

IX. Scope of the Assessment

The assessment may cover all of the 22 districts affected by the flooding with a special focus on vulnerable groups (communities in low income urban settlements in Colombo and communities affected by the landslides in the central districts that would need to be relocated) and may include the following sectors, following partly the clusters that have worked on the humanitarian assessment:

Sector	Lead Ministry	Co-lead Agency	Contributing Agencies
Social Sectors			
Housing, Land and Settlements	Ministry of Housing and Construction	UNHABITAT	UNOPS Ministry of Home Affairs, NBRO, NDRSC, Ministry of Hill Country
Health and Nutrition	Ministry of Health	WHO	UNICEF
Education	Ministry of Education	UNICEF	Ministry of Highways and Higher Education
Productive Sectors			
Food Security, Agriculture, Livestock, Fisheries	Ministry of Agriculture	FAO, WFP	
Industry and Commerce	Ministry of Industry and Commerce Ceylon Chamber of Commerce	ILO, UNDP	World Bank
Infrastructure			
Irrigation	TBC	World Bank	
Water and Sanitation	National Water Supply and Drainage Board Ministry of CP and Water Supply	UNICEF	UNOPS
Transport	Ministry of Highways and Higher Education	World Bank	UNOPS
Power Supply	Ministry of Power and Renewable Energy	World Bank	
Cross Cutting Issues			
Environment	Ministry of Mahaweli Development and Environment	UNDP	Ministry of Sustainable Development and Wildlife
Disaster Risk Reduction including Urban Risks	Ministry of Disaster Management	UNDP	UNICEF
Gender and Social Inclusion	Ministry of Women and Children's Affairs	UN Women	UNICEF, UNFPA, NCPA
Human Impact including vulnerable groups		UNDP	UNICEF; UNWOMEN
Macro-economic and Poverty Analysis	-	World Bank	

Each sector team will be led by Government officials from line ministries and supported by representatives from the World Bank, the UN and the EU.

Management and Coordination arrangements

Coordination structures to be put in place to guide the PDNA exercise include:

High level Management Team

MPPEA and NDMCC (National Disaster Management Coordination Committee) through the MDM, oversees will:

- Provide strategic decisions and guidance to the overall PDNA processes;
- Provide decisions related to resources required for the PDNA exercise;
- Act as a link between International Community, GoSL and the core PDNA Coordination team.

Coordination Team

A Core Secretariat for the PDNA would be established, consisting of: the MNPEA, DMC/MDM as the lead, together with the UN, the EU, the WB and any other relevant partner(s). The function of the core Secretariat is as follows:

- Complete the identification of participants for the PDNA and confirm availability
- Facilitate logistical arrangements of mission activities (venue, field trips etc.)
- Compile background data needed for the PDNA (including existing assessment reports, Flash Appeal Report, maps etc.)
- Compile baseline data for the PDNA from the various participating Ministries, using the matrices provided previously by the mission
- Prepare standard field datasheets for each sub-sector team, in consultation with experts, ensuring that gender and other relevant cross-cutting issues are integrated into all sectors effectively and comprehensively
- Provide technical guidance to the assessment & report to the High level management team
- Organise consultations required for the PDNA process and for finalisation of the Recovery Strategy
- Facilitate the high level meeting to present the outcome of the assessment report

Report Secretariat

- Review sector outputs and provide guidance in the compilation of the assessment report
- Ensure that gender and other relevant cross-cutting issues are integrated into all sectors effectively and comprehensively
- Draft final report for the PDNA

Annex 3. District Breakdown of Damages and Losses[191]

Total of all sectors with district-wise data available

Districts	Damages (LKR)	Losses (LKR)	Total Effect (LKR)	%
Ampara	859,202,573	93,518,451	952,721,024	1.06
Anuradhapura	999,436,031	325,750,838	1,325,186,869	1.48
Badulla	335,808,222	21,485,064	357,293,286	0.40
Batticaloa	132,501,803	87,831,971	220,333,774	0.25
Colombo	38,056,918,164	2,083,112,872	40,140,031,036	44.83
Galle	615,515,000	1,700,000	617,215,000	0.69
Gampaha	19,516,476,875	6,403,610,609	25,920,087,484	28.95
Hambantota	120,944,012	21,473,661	142,417,673	0.16
Jaffna	744,909,752	40,238,930	785,148,682	0.88
Kalutara	1,090,333,500	5,804,800	1,096,138,300	1.22
Kandy	1,870,622,230	59,908,180	1,930,530,410	2.16
Kegalle	8,779,442,480	484,249,653	9,263,692,133	10.35
Kilinochchi	125,173,570	131,125,570	256,299,140	0.29
Kurunegala	641,380,763	128,270,939	769,651,702	0.86
Mannar	87,908,922	131,505,448	219,414,370	0.25
Matale	309,360,000	0	309,360,000	0.35
Matara	517,025,000	0	517,025,000	0.58
Mullaitivu	345,318,488	131,271,045	476,589,533	0.53
Nuwara Eliya	249,650,916	9,134,120	258,785,036	0.29
Polonnaruwa	188,316,824	122,616,994	310,933,818	0.35
Puttalam	1,788,469,728	498,709,839	2,287,179,567	2.55
Ratnapura	551,301,571	176,985,649	728,287,219	0.81
Trincomalee	191,507,438	110,283,142	301,790,580	0.34
Vavuniya	347,670,000	10,888,000	358,558,000	0.40
Total	**78,465,193,861**	**11,079,475,774**	**89,544,669,636**	**100.00**

Table 109. Damages and losses by district-Overall total.

191 For two reasons the amounts here differ from previous figures: 1) Not all sectors were in the position to provide a district-wide breakdown. 2) Some sectors included the 25th district Moneragala, which is not analysed in the overall PDNA.

Housing, Land and Settlements Sector

Districts	Damages (LKR)	Losses (LKR)	Total Effect (LKR)	%
Ampara	31,720,000	0	31,720,000	0.06
Anuradhapura	187,418,000	0	187,418,000	0.33
Badulla	82,970,000	0	82,970,000	0.15
Batticaloa	39,625,000	0	39,625,000	0.07
Colombo	29,223,183,725	141,645,377	29,364,829,102	52.45
Galle	383,415,000	0	383,415,000	0.68
Gampaha	12,671,866,875	42,612,707	12,714,479,582	22.71
Hambantota	108,260,250	0	108,260,250	0.19
Jaffna	272,880,000	0	272,880,000	0.49
Kalutara	991,563,500	0	991,563,500	1.77
Kandy	1,532,864,750	1,368,737	1,534,233,487	2.74
Kegalle	7,662,450,000	69,270,817	7,731,720,817	13.81
Kilinochchi	85,723,000	0	85,723,000	0.15
Kurunegala	223,097,000	0	223,097,000	0.40
Mannar	24,953,750	0	24,953,750	0.04
Matale	277,360,000	0	277,360,000	0.50
Matara	259,125,000	0	259,125,000	0.46
Mullaitivu	95,788,000	0	95,788,000	0.17
Nuwara Eliya	137,940,000	461,460	138,401,460	0.25
Polonnaruwa	144,465,125	0	144,465,125	0.26
Puttalam	720,375,000	391,068	720,766,068	1.29
Ratnapura	346,241,000	195,534	346,436,534	0.62
Trincomalee	42,585,000	0	42,585,000	0.08
Vavuniya	183,370,000	0	183,370,000	0.33
Total	**55,729,239,975**	**255,945,700**	**55,985,185,675**	**100.00**

Table 110. Damages and losses by district-Housing, Land and Settlements Sector.

Health Sector

Districts	Damages (LKR)	Losses (LKR)	Total Effect (LKR)	%
Ampara	0	0	0	0.00
Anuradhapura	0	0	0	0.00
Badulla	0	0	0	0.00
Batticaloa	0	0	0	0.00
Colombo	468,500,000	70,974,030	539,474,030	90.34
Galle	0	0	0	0.00
Gampaha	0	25,263,902	25,263,902	4.23
Hambantota	0	0	0	0.00
Jaffna	0	0	0	0.00
Kalutara	0	0	0	0.00
Kandy	0	0	0	0.00
Kegalle	10,000,000	22,444,356	32,444,356	5.43
Kilinochchi	0	0	0	0.00
Kurunegala	0	0	0	0.00
Mannar	0	0	0	0.00
Matale	0	0	0	0.00
Matara	0	0	0	0.00
Mullaitivu	0	0	0	0.00
Nuwara Eliya	0	0	0	0.00
Polonnaruwa	0	0	0	0.00
Puttalam	0	0	0	0.00
Ratnapura	0	0	0	0.00
Trincomalee	0	0	0	0.00
Vavuniya	0	0	0	0.00
Total	**478,500,000**	**118,682,288**	**597,182,288**	**100.00**

Table 111. Damages and losses by district-Health Sector.

Food Security, Agriculture, Livestock, Fisheries Sector

Districts	Damages (LKR)	Losses (LKR)	Total Effect (LKR)	%
Ampara	21,682,573	93,518,451	115,201,024	3.66
Anuradhapura	380,765,431	273,778,238	654,543,669	20.79
Badulla	23,638,222	21,485,064	45,123,286	1.43
Batticaloa	15,146,803	87,831,971	102,978,774	3.27
Colombo	124,439	13,063,465	13,187,904	0.42
Galle	43,500,000	1,700,000	45,200,000	1.44
Gampaha	0	12,244,000	12,244,000	0.39
Hambantota	12,383,762	21,473,661	33,857,423	1.08
Jaffna	433,029,752	40,238,930	473,268,682	15.04
Kalutara	0	5,804,800	5,804,800	0.18
Kandy	57,480	58,539,443	58,596,923	1.86
Kegalle	1,100,000	52,192,000	53,292,000	1.69
Kilinochchi	37,650,570	131,125,570	168,776,140	5.36
Kurunegala	89,783,763	128,270,939	218,054,702	6.93
Mannar	55,955,172	131,505,448	187,460,620	5.96
Matale	7,000,000	0	7,000,000	0.22
Matara	57,900,000	0	57,900,000	1.84
Mullaitivu	234,530,488	131,271,045	365,801,533	11.62
Nuwara Eliya	790,916	8,672,660	9,463,576	0.30
Polonnaruwa	43,851,699	122,616,994	166,468,693	5.29
Puttalam	65,331,528	66,925,571	132,257,099	4.20
Ratnapura	14,248,891	20,098,435	34,347,325	1.09
Trincomalee	36,922,438	110,283,142	147,205,580	4.68
Vavuniya	28,800,000	10,888,000	39,688,000	1.26
Total	**1,604,193,926**	**1,543,527,826**	**3,147,721,753**	**100.00**

Table 112. Damages and losses by district-Food Security, Agriculture, Livestock, Fisheries Sector.

Industry and Commerce Sector

Districts	Damages (LKR)	Losses (LKR)	Total Effect (LKR)	%
Ampara	0	0	0	0.00
Anuradhapura	64,522,600	51,972,600	116,495,200	0.49
Badulla	0	0	0	0.00
Batticaloa	0	0	0	0.00
Colombo	7,311,320,000	1,801,640,000	9,112,960,000	38.44
Galle	0	0	0	0.00
Gampaha	6,296,780,000	6,289,270,000	12,586,050,000	53.09
Hambantota	0	0	0	0.00
Jaffna	0	0	0	0.00
Kalutara	0	0	0	0.00
Kandy	0	0	0	0.00
Kegalle	399,512,480	324,982,480	724,494,960	3.06
Kilinochchi	0	0	0	0.00
Kurunegala	0	0	0	0.00
Mannar	0	0	0	0.00
Matale	0	0	0	0.00
Matara	0	0	0	0.00
Mullaitivu	0	0	0	0.00
Nuwara Eliya	0	0	0	0.00
Polonnaruwa	0	0	0	0.00
Puttalam	430,323,200	420,343,200	850,666,400	3.59
Ratnapura	165,381,680	153,091,680	318,473,360	1.34
Trincomalee	0	0	0	0.00
Vavuniya	0	0	0	0.00
Total	**14,667,839,960**	**9,041,299,960**	**23,709,139,920**	**100.00**

Table 113. Damages and losses by district-Industry and Commerce Sector.

Irrigation Sector

Districts	Damages (LKR)	Losses (LKR)	Total Effect (LKR)	%
Ampara	752,000,000	0	752,000,000	44.88
Anuradhapura	204,220,000	0	204,220,000	12.19
Badulla		0	0	0.00
Batticaloa	23,100,000	0	23,100,000	1.38
Colombo	70,000,000	0	70,000,000	4.18
Galle	6,100,000	0	6,100,000	0.36
Gampaha	70,000,000	0	70,000,000	4.18
Hambantota	0	0	0	0.00
Jaffna	0	0	0	0.00
Kalutara	0	0	0	0.00
Kandy	0	0	0	0.00
Kegalle	0	0	0	0.00
Kilinochchi	0	0	0	0.00
Kurunegala	50,000,000	0	50,000,000	2.98
Mannar	0	0	0	0.00
Matale	0	0	0	0.00
Matara	0	0	0	0.00
Mullaitivu	0	0	0	0.00
Nuwara Eliya	0	0	0	0.00
Polonnaruwa	0	0	0	0.00
Puttalam	320,000,000	0	320,000,000	19.10
Ratnapura	0	0	0	0.00
Trincomalee	55,000,000	0	55,000,000	3.28
Vavuniya	125,000,000	0	125,000,000	7.46
Total	**1,675,420,000**	**0**	**1,675,420,000**	**100.00**

Table 114. Damages and losses by district-Irrigation Sector.

Water and Sanitation Sector

Districts	Damages (LKR)	Losses (LKR)	Total Effect (LKR)	%
Ampara	0	0	0	0.00
Anuradhapura	0	0	0	0.00
Badulla	0	0	0	0.00
Batticaloa	0	0	0	0.00
Colombo	192,000,000	39,390,000	231,390,000	52.22
Galle	0	0	0	0.00
Gampaha	95,430,000	26,220,000	121,650,000	27.45
Hambantota	0	0	0	0.00
Jaffna	0	0	0	0.00
Kalutara	0	0	0	0.00
Kandy	0	0	0	0.00
Kegalle	48,250,000	7,960,000	56,210,000	12.68
Kilinochchi	0	0	0	0.00
Kurunegala	0	0	0	0.00
Mannar	0	0	0	0.00
Matale	0	0	0	0.00
Matara	0	0	0	0.00
Mullaitivu	0	0	0	0.00
Nuwara Eliya	0	0	0	0.00
Polonnaruwa	0	0	0	0.00
Puttalam	30,940,000	2,950,000	33,890,000	7.65
Ratnapura	0	0	0	0.00
Trincomalee	0	0	0	0.00
Vavuniya	0	0	0	0.00
Total	**366,620,000**	**76,520,000**	**443,140,000**	**100.00**

Table 115. Damages and losses by district-Water and Sanitation Sector.

Transport Sector

Districts	Damages (LKR)	Losses (LKR)	Total Effect (LKR)	%
Ampara	53,800,000	0	53,800,000	1.35
Anuradhapura	162,510,000	0	162,510,000	4.08
Badulla	229,200,000	0	229,200,000	5.75
Batticaloa	54,630,000	0	54,630,000	1.37
Colombo	791,790,000	16,400,000	808,190,000	20.27
Galle	182,500,000	0	182,500,000	4.58
Gampaha	382,400,000	8,000,000	390,400,000	9.79
Hambantota	300,000	0	300,000	0.01
Jaffna	39,000,000	0	39,000,000	0.98
Kalutara	98,770,000	0	98,770,000	2.48
Kandy	337,700,000	0	337,700,000	8.47
Kegalle	658,130,000	7,400,000	665,530,000	16.69
Kilinochchi	1,800,000	0	1,800,000	0.05
Kurunegala	278,500,000	0	278,500,000	6.99
Mannar	7,000,000	0	7,000,000	0.18
Matale	25,000,000	0	25,000,000	0.63
Matara	200,000,000	0	200,000,000	5.02
Mullaitivu	15,000,000	0	15,000,000	0.38
Nuwara Eliya	110,920,000	0	110,920,000	2.78
Polonnaruwa	0	0	0	0.00
Puttalam	221,500,000	8,100,000	229,600,000	5.76
Ratnapura	25,430,000	3,600,000	29,030,000	0.73
Trincomalee	57,000,000	0	57,000,000	1.43
Vavuniya	10,500,000	0	10,500,000	0.26
Total	**3,943,380,000**	**43,500,000**	**3,986,880,000**	**100.00**

Table 116. Damages and losses by district Transport Sector.

Annex 4. District Breakdown of Recovery Needs[192]

192 *For two reasons the amounts here differ from previous figures: 1) Not all sectors were in the position to provide a district-wide breakdown. 2) Some sectors included the 25th district Moneragala, which is not analysed in the overall PDNA.*

Total of all sectors with district-wise data available

Districts	Short-term (LKR)	%	Medium-term (LKR)	%	Long-term (LKR)	%	Total (LKR)	%
Ampara	83,798,645	2	237,535,764	0.76	20,002,126	0.02	341,336,535	0.26
Anuradhapura	241,478,657	5	539,770,928	1.73	164,716,419	0.17	945,966,004	0.72
Badulla	234,643,984	4.9	86,792,781	0.28	10,261,973	0.01	331,698,739	0.25
Batticaloa	70,524,069	1.47	79,953,358	0.26	21,397,510	0.02	171,874,936	0.13
Colombo	1,055,727,080	22	15,225,590,660	48.75	62,869,805,173	66.49	79,151,122,912	60.62
Galle	188,853,239	4	332,939,026	1.07	21,224,334	0.02	543,016,600	0.42
Gampaha	630,269,701	13	6,493,972,124	20.79	23,162,271,689	24.5	30,286,513,514	23.2
Hambantota	4,384,793	0	77,736,671	0.25	35,896,330	0.04	118,017,794	0.09
Jaffna	96,098,394	2	408,571,298	1.31	73,175,341	0.08	577,845,033	0.44
Kalutara	99,500,331	2	792,497,067	2.54	166,574,570	0.18	1,058,571,969	0.81
Kandy	348,769,536	7	958,674,316	3.07	439,981,225	0.47	1,747,425,078	1.34
Kegalle	730,059,514	15	2,580,982,609	8.26	5,141,740,044	5.44	8,452,782,167	6.47
Kilinochchi	22,162,316	0.46	353,931,495	1.13	262,626,445	0.28	638,720,257	0.49
Kurunegala	310,807,621	6.49	567,157,398	1.82	326,093,294	0.34	1,204,058,313	0.92
Mannar	29,616,541	0.62	130,984,914	0.42	54,170,732	0.06	214,772,186	0.16
Matale	25,844,528	0.54	106,191,632	0.34	69,464,918	0.07	201,501,078	0.15
Matara	50,985,455	1.06	189,267,677	0.61	113,716,319	0.12	353,969,450	0.27
Mullaitivu	59,132,817	1.23	341,758,333	1.09	82,840,302	0.09	483,731,452	0.37
Nuwara Eliya	112,041,751	2.34	116,341,630	0.37	13,313,529	0.01	241,696,910	0.19
Polonnaruwa	20,083,930	0.42	259,748,403	0.83	93,631,975	0.1	373,464,308	0.29
Puttalam	237,456,407	4.96	790,947,814	2.53	116,813,584	0.12	1,145,217,805	0.88
Ratnapura	39,543,898	0.83	189,458,773	0.61	1,225,391,077	1.3	1,454,393,748	1.11
Trincomalee	83,059,895	1.73	148,197,666	0.47	23,855,522	0.03	255,113,083	0.2
Vavuniya	15,288,234	0.32	221,713,581	0.71	41,178,036	0.04	278,179,851	0.21
Total	**4,790,131,336**	**100**	**31,230,715,918**	**100**	**94,550,142,468**	**100**	**130,570,989,722**	**100**

Table 117. Recovery Needs by district-Overall total.

Housing, Land and Settlements Sector

Districts	Short-term (LKR)	%	Medium-term (LKR)	%	Long-term (LKR)	%	Total (LKR)	%
Ampara	0	0.00	29,108,600	0.10	2,190,100	0.00	31,298,700	0.03
Anuradhapura	0	0.00	202,051,900	0.70	63,512,900	0.07	265,564,800	0.22
Badulla	0	0.00	66,061,650	0.23	3,285,150	0.00	69,346,800	0.06
Batticaloa	0	0.00	13,041,500	0.05	5,475,250	0.01	18,516,750	0.02
Colombo	61,536,000	25.23	14,512,891,700	50.63	62,837,766,100	67.21	77,412,193,800	63.24
Galle	0	0.00	307,172,650	1.07	14,235,650	0.02	321,408,300	0.26
Gampaha	182,392,500	74.77	6,445,546,825	22.48	23,160,378,560	24.77	29,788,317,885	24.33
Hambantota	0	0.00	62,181,450	0.22	30,661,400	0.03	92,842,850	0.08
Jaffna	0	0.00	191,136,000	0.67	0	0.00	191,136,000	0.16
Kalutara	0	0.00	789,830,150	2.76	165,677,050	0.18	955,507,200	0.78
Kandy	0	0.00	931,752,950	3.25	430,921,150	0.46	1,362,674,100	1.11
Kegalle	0	0.00	2,509,098,500	8.75	4,601,500,200	4.92	7,110,598,700	5.81
Kilinochchi	0	0.00	276,390,150	0.96	236,530,800	0.25	512,920,950	0.42
Kurunegala	0	0.00	461,975,850	1.61	292,378,350	0.31	754,354,200	0.62
Mannar	0	0.00	44,859,300	0.16	25,186,150	0.03	70,045,450	0.06
Matale	0	0.00	102,975,600	0.36	68,382,600	0.07	171,358,200	0.14
Matara	0	0.00	162,666,500	0.57	104,764,000	0.11	267,430,500	0.22
Mullaitivu	0	0.00	173,697,000	0.61	26,281,200	0.03	199,978,200	0.16
Nuwara Eliya	0	0.00	111,993,750	0.39	11,850,300	0.01	123,844,050	0.10
Polonnaruwa	0	0.00	183,267,175	0.64	67,893,100	0.07	251,160,275	0.21
Puttalam	0	0.00	693,184,525	2.42	96,364,400	0.10	789,548,925	0.64
Ratnapura	0	0.00	171,118,475	0.60	1,220,080,400	1.30	1,391,198,875	1.14
Trincomalee	0	0.00	33,966,550	0.12	1,095,050	0.00	35,061,600	0.03
Vavuniya	0	0.00	190,979,600	0.67	35,041,600	0.04	226,021,200	0.18
Total	**243,928,500**	**100.00**	**28,666,948,350**	**100.00**	**93,501,451,460**	**100.00**	**122,412,328,310**	**100.00**

Table 118. Recovery Needs by district-Housing, Land and Settlements Sector.

Health Sector

Districts	Short-term (LKR)	%	Medium-term (LKR)	%	Long-term (LKR)	%	Total (LKR)	%
Ampara	0	0.00	0	0.00	0	0.00	0	0.00
Anuradhapura	0	0.00	0	0.00	0	0.00	0	0.00
Badulla	0	0.00	0	0.00	0	0.00	0	0.00
Batticaloa	0	0.00	0	0.00	0	0.00	0	0.00
Colombo	200,800,000	65.03	583,800,000	100.00	30,000,000	21.43	814,600,000	78.89
Galle	0	0.00	0	0.00	0	0.00	0	0.00
Gampaha	64,000,000	20.73	0	0.00	0	0.00	64,000,000	6.20
Hambantota	0	0.00	0	0.00	0	0.00	0	0.00
Jaffna	0	0.00	0	0.00	0	0.00	0	0.00
Kalutara	0	0.00	0	0.00	0	0.00	0	0.00
Kandy	4,000,000	1.30	0	0.00	0	0.00	4,000,000	0.39
Kegalle	24,000,000	7.77	0	0.00	110,000,000	78.57	134,000,000	12.98
Kilinochchi	0	0.00	0	0.00	0	0.00	0	0.00
Kurunegala	6,000,000	1.94	0	0.00	0	0.00	6,000,000	0.58
Mannar	0	0.00	0	0.00	0	0.00	0	0.00
Matale	0	0.00	0	0.00	0	0.00	0	0.00
Matara	0	0.00	0	0.00	0	0.00	0	0.00
Mullaitivu	0	0.00	0	0.00	0	0.00	0	0.00
Nuwara Eliya	0	0.00	0	0.00	0	0.00	0	0.00
Polonnaruwa	0	0.00	0	0.00	0	0.00	0	0.00
Puttalam	0	0.00	0	0.00	0	0.00	0	0
Ratnapura	10,000,000	3.24	0	0.00	0	0.00	10,000,000	0.97
Trincomalee	0	0.00	0	0.00	0	0.00	0	0.00
Vavuniya	0	0.00	0	0.00	0	0.00	0	0.00
Total	**308,800,000**	**100.00**	**583,800,000**	**100.00**	**140,000,000**	**100.00**	**1,032,600,000**	**100.00**

Table 119. Recovery Needs by district-Health Sector.

Food Security, Agriculture, Livestock, Fisheries Sector

Districts	Short-term (LKR)	%	Medium-term (LKR)	%	Long-term (LKR)	%	Total (LKR)	%
Ampara	13,898,645	3.66	52,927,164	3.66	17,812,026	3.66	84,637,835	3.66
Anuradhapura	78,968,657	20.79	300,719,028	20.79	101,203,519	20.79	480,891,204	20.79
Badulla	5,443,984	1.43	20,731,131	1.43	6,976,823	1.43	33,151,939	1.43
Batticaloa	12,424,069	3.27	47,311,858	3.27	15,922,260	3.27	75,658,186	3.27
Colombo	1,591,080	0.42	6,058,960	0.42	2,039,073	0.42	9,689,112	0.42
Galle	5,453,239	1.44	20,766,376	1.44	6,988,684	1.44	33,208,300	1.44
Gampaha	1,477,201	0.39	5,625,299	0.39	1,893,129	0.39	8,995,629	0.39
Hambantota	4,084,793	1.08	15,555,221	1.08	5,234,930	1.08	24,874,944	1.08
Jaffna	57,098,394	15.04	217,435,298	15.04	73,175,341	15.04	347,709,033	15.04
Kalutara	700,331	0.18	2,666,917	0.18	897,520	0.18	4,264,769	0.18
Kandy	7,069,536	1.86	26,921,366	1.86	9,060,075	1.86	43,050,978	1.86
Kegalle	6,429,514	1.69	24,484,109	1.69	8,239,844	1.69	39,153,467	1.69
Kilinochchi	20,362,316	5.36	77,541,345	5.36	26,095,645	5.36	123,999,307	5.36
Kurunegala	26,307,621	6.93	100,181,548	6.93	33,714,944	6.93	160,204,113	6.93
Mannar	22,616,541	5.96	86,125,614	5.96	28,984,582	5.96	137,726,736	5.96
Matale	844,528	0.22	3,216,032	0.22	1,082,318	0.22	5,142,878	0.22
Matara	6,985,455	1.84	26,601,177	1.84	8,952,319	1.84	42,538,950	1.84
Mullaitivu	44,132,817	11.62	168,061,333	11.62	56,559,102	11.62	268,753,252	11.62
Nuwara Eliya	1,141,751	0.30	4,347,880	0.30	1,463,229	0.30	6,952,860	0.30
Polonnaruwa	20,083,930	5.29	76,481,228	5.29	25,738,875	5.29	122,304,033	5.29
Puttalam	15,956,407	4.20	60,763,289	4.20	20,449,184	4.20	97,168,880	4.20
Ratnapura	4,143,898	1.09	15,780,298	1.09	5,310,677	1.09	25,234,873	1.09
Trincomalee	17,759,895	4.68	67,631,116	4.68	22,760,472	4.68	108,151,483	4.68
Vavuniya	4,788,234	1.26	18,233,981	1.26	6,136,436	1.26	29,158,651	1.26
Total	**379,762,836**	**100.00**	**1,446,167,568**	**100.00**	**486,691,008**	**100.00**	**2,312,621,412**	**100.00**

Table 120. Recovery Needs by district-Food Security, Agriculture, Livestock, Fisheries Sector.

Irrigation Sector

Districts	Short-term (LKR)	%	Medium-term (LKR)	%	Long-term (LKR)[193]	%	Total (LKR)	%
Ampara	16,100,000	55.90	155,500,000	47.52		0.00	171,600,000	48.20
Anuradhapura	0	0.00	37,000,000	11.31		0.00	37,000,000	10.39
Badulla	0	0.00	0	0.00		0.00	0	0.00
Batticaloa	3,500,000	12.15	19,600,000	5.99		0.00	23,100,000	6.49
Colombo	0	0.00	7,000,000	2.14		0.00	7,000,000	1.97
Galle	900,000	3.13	5,000,000	1.53		0.00	5,900,000	1.66
Gampaha	0	0.00	7,000,000	2.14		0.00	7,000,000	1.97
Hambantota	0	0.00	0	0.00		0.00	0	0.00
Jaffna	0	0.00	0	0.00		0.00	0	0.00
Kalutara	0	0.00	0	0.00		0.00	0	0.00
Kandy	0	0.00	0	0.00		0.00	0	0.00
Kegalle	0	0.00	0	0.00		0.00	0	0.00
Kilinochchi	0	0.00	0	0.00		0.00	0	0.00
Kurunegala	0	0.00	5,000,000	1.53		0.00	5,000,000	1.40
Mannar	0	0.00	0	0.00		0.00	0	0.00
Matale	0	0.00	0	0.00		0.00	0	0.00
Matara	0	0.00	0	0.00		0.00	0	0.00
Mullaitivu	0	0.00	0	0.00		0.00	0	0.00
Nuwara Eliya	0	0.00	0	0.00		0.00	0	0.00
Polonnaruwa	0	0.00	0	0.00		0.00	0	0.00
Puttalam	0	0.00	32,000,000	9.78		0.00	32,000,000	8.99
Ratnapura	0	0.00	0	0.00		0.00	0	0.00
Trincomalee	8,300,000	28.82	46,600,000	14.24		0.00	54,900,000	15.42
Vavuniya	0	0.00	12,500,000	3.82		0.00	12,500,000	3.51
Total	**28,800,000**	**100.00**	**327,200,000**	**100.00**	**1,600,000,000**	**0.00**	**1,956,000,000**	**100.00**

Table 121. Recovery Needs by district-Irrigation Sector.

193 Tentative provisions, which can be updated after the preparation of a more precise inventory of, flood damages and completion of the ongoing flood modelling studies of the eleven river basins. Hence, this sector does not have a district-wise breakdown for long-term needs at this stage.

Water and Sanitation Sector

Districts	Short-term (LKR)	%	Medium-term (LKR)	%	Long-term (LKR)	%	Total (LKR)	%
Ampara	0	0.00	0	0.00	0	0.00	0	0.00
Anuradhapura	0	0.00	0	0.00	0	0.00	0	0.00
Badulla	0	0.00	0	0.00	0	0.00	0	0.00
Batticaloa	0	0.00	0	0.00	0	0.00	0	0.00
Colombo	0	0.00	115,840,000	56.07	0	0.00	115,840,000	17.29
Galle	0	0.00	0	0.00	0	0.00	0	0.00
Gampaha	0	0.00	35,800,000	17.33	0	0.00	35,800,000	5.34
Hambantota	0	0.00	0	0.00	0	0.00	0	0.00
Jaffna	0	0.00	0	0.00	0	0.00	0	0.00
Kalutara	0	0.00	0	0.00	0	0.00	0	0.00
Kandy	0	0.00	0	0.00	0	0.00	0	0.00
Kegalle	41,500,000	100.00	47,400,000	22.94	422,000,000	100.00	510,900,000	76.24
Kilinochchi	0	0.00	0	0.00	0	0.00	0	0.00
Kurunegala	0	0.00	0	0.00	0	0.00	0	0.00
Mannar	0	0.00	0	0.00	0	0.00	0	0.00
Matale	0	0.00	0	0.00	0	0.00	0	0.00
Matara	0	0.00	0	0.00	0	0.00	0	0.00
Mullaitivu	0	0.00	0	0.00	0	0.00	0	0.00
Nuwara Eliya	0	0.00	0	0.00	0	0.00	0	0.00
Polonnaruwa	0	0.00	0	0.00	0	0.00	0	0.00
Puttalam	0	0.00	5,000,000	2.42	0	0.00	5,000,000	0.75
Ratnapura	0	0.00	2,560,000	1.24	0	0.00	2,560,000	0.38
Trincomalee	0	0.00	0	0.00	0	0.00	0	0.00
Vavuniya	0	0.00	0	0.00	0	0.00	0	0.00
Total	**41,500,000**	**100.00**	**206,600,000**	**100.00**	**422,000,000**	**100.00**	**670,100,000**	**100.00**

Table 122. Recovery Needs by district-Water and Sanitation Sector.

Transport Sector

Districts	Short-term (LKR)	%	Medium-term (LKR)	%	Long-term (LKR)	%	Total (LKR)	%
Ampara	53,800,000	1.42	0	0.00	0	0.00	53,800,000	1.42
Anuradhapura	162,510,000	4.29	0	0.00	0	0.00	162,510,000	4.29
Badulla	229,200,000	6.05	0	0.00	0	0.00	229,200,000	6.05
Batticaloa	54,600,000	1.44	0	0.00	0	0.00	54,600,000	1.44
Colombo	791,800,000	20.91	0	0.00	0	0.00	791,800,000	20.91
Galle	182,500,000	4.82	0	0.00	0	0.00	182,500,000	4.82
Gampaha	382,400,000	10.10	0	0.00	0	0.00	382,400,000	10.10
Hambantota	300,000	0.01	0	0.00	0	0.00	300,000	0.01
Jaffna	39,000,000	1.03	0	0.00	0	0.00	39,000,000	1.03
Kalutara	98,800,000	2.61	0	0.00	0	0.00	98,800,000	2.61
Kandy	337,700,000	8.92	0	0.00	0	0.00	337,700,000	8.92
Kegalle	658,130,000	17.38	0	0.00	0	0.00	658,130,000	17.38
Kilinochchi	1,800,000	0.05	0	0.00	0	0.00	1,800,000	0.05
Kurunegala	278,500,000	7.35	0	0.00	0	0.00	278,500,000	7.35
Mannar	7,000,000	0.18	0	0.00	0	0.00	7,000,000	0.18
Matale	25,000,000	0.66	0	0.00	0	0.00	25,000,000	0.66
Matara	44,000,000	1.16	0	0.00	0	0.00	44,000,000	1.16
Mullaitivu	15,000,000	0.40	0	0.00	0	0.00	15,000,000	0.40
Nuwara Eliya	110,900,000	2.93	0	0.00	0	0.00	110,900,000	2.93
Polonnaruwa	0	0.00	0	0.00	0	0.00	0	0.00
Puttalam	221,500,000	5.85	0	0.00	0	0.00	221,500,000	5.85
Ratnapura	25,400,000	0.67	0	0.00	0	0.00	25,400,000	0.67
Trincomalee	57,000,000	1.51	0	0.00	0	0.00	57,000,000	1.51
Vavuniya	10,500,000	0.28	0	0.00	0	0.00	10,500,000	0.28
Total	**3,787,340,000**	**100.00**	**0**	**0.00**	**0**	**0.00**	**3,787,340,000**	**100.00**

Table 123. Recovery Needs by district-Transport Sector.

Annex 5. Bibliography

Ariyarathne, T, Lokuge, G., Najab N. and Fernando, P., 2014. The vulnerability of women in the economy. [ONLINE] Available at: http://www.cepa.lk/uploads/4bae1bc28cb6cbe73a08a2bf084b8fa3-120830-ER-The-vulnerability-of-women-in-the-economy---CEPA.pdf. [Accessed September 20, 2016].

Asian Development Bank, 2015, Country Gender Assessment Sri Lanka: An Update. [ONLINE] Available at: https://www.adb.org/sites/default/files/institutional-document/172710/sri-lanka-country-gender-assessment-update.pdf. [Accessed September 20, 2016]

Bandara N . 2008. Municipal Solid Waste Management-The Sri Lankan Case.

Barenstein, J.D, 2012, The role of communities in post-disaster reconstruction. A call for owner-driven approaches. [ONLINE] Available at: http://www.tafterjournal.it/2012/08/01/the-role-of-communities-in-post-disaster-reconstruction-a-call-for-owner-driven-approaches/. [Accessed September 20, 2016]

Board of Investment of Sri Lanka, 2013, Annual Report 2013. [ONLINE] Available at: http://www.investsrilanka.com/images/publications/pdf/Annual_Report_2013.pdf. [Accessed September 20, 2016].

Central Bank of Sri Lanka, 2015, Annual Report 2015. [ONLINE] Available at: http://www.cbsl.gov.lk/pics_n_docs/10_pub/_docs/efr/annual_report/AR2015/English/content.htm. [Accessed September 20, 2016].

Department of Census and Statistics and Ministry of Women's Affairs, 2014, The Sri Lankan Women: Partner in Progress. [ONLINE] Available at: http://www.childwomenmin.gov.lk/resources/29/The%20Sri%20Lankan%20Woman.pdf. [Accessed 20 September 2016]

Department of Census and Statistics, 2001, Brief Analysis of Characteristics of the Disabled Persons. [ONLINE] Available at: http://www.statistics.gov.lk/PopHouSat/PDF/p8%20Disabled%20Chapter.pdf. [Accessed September 20, 2016]

Department of Census and Statistics, 2010, Concepts and definitions. [ONLINE] Available at: http://www.statistics.gov.lk/pophousat/cph2011/index.php?fileName=ConceptsandDefinitions&gp=StudyMaterials&tpl=2. [Accessed September 20, 2016]

Department of Census and Statistics. 2012. Census of Population and Housing 2012: Key Findings, [ONLINE] Available at: http://www.statistics.gov.lk/pophousat/cph2011/pages/activities/reports/cph_2012_5per_rpt.pdf. [Accessed September 20, 2016].

Department of Census and Statistics, 2013, Annual Survey of Industries: Final Report 2013. [ONLINE] Available at: http://www.statistics.gov.lk/industry/ASI%202013%20report.pdf. [Accessed September 20, 2016]

Department of Census and Statistics. 2014. Mid-year Population Estimates by District and Sex 2013-2015. [ONLINE] Available at: http://www.statistics.gov.lk/PopHouSat/VitalStatistics/MidYearPopulation/Mid-year%20population%20by%20district.pdf. [Accessed September 20, 2016].

Department of Census and Statistics. 2014. Poverty Headcount Ratio Brief: Decomposition of Consumption Poverty. [ONLINE] Available at: http://www.statistics.gov.lk/poverty/HIES-2012-13-News%20Brief.pdf. [Accessed September 20, 2016].

Department of National Planning, 2010, The Development of Policy Framework, Ministry of Finance and Planning, Government of Sri Lanka. [ONLINE] Available at: https://www.adb.org/sites/default/files/linked-documents/cps-sri-2012-2016-oth-01.pdf. [Accessed September 20, 2016]

Department of Wildlife Conservation, 2013, The First Island wide National Survey of Elephants in 2011. A Report Prepared by the Department of Wildlife Conservation, Sri Lanka, pp.15

Emerton, L. and L. Kekulandala, 2003, Assessment of the Economic Value of Muthurajawela Wetland. Occ. Pap. IUCN, Sri Lanka, [Online]. No.4, Available at: https://portals.iucn.org/library/efiles/documents/2003-005.pdf [Accessed September 20, 2016]

Fernando, P., 2015, Managing Elephants in Sri Lanka: Where We Are and Where We Need to Be. Ceylon Journal of Science (Bio. Sci.) , vol.44 (1), pp.1-11

Garschagen, Matthias., Michael Hagenlocher, Martina Comes, Mirjam Dubbert, Robert Sabelfeld, Yew Jin Lee, Ludwig Grunewald, Matthias Lanzendörfer, Peter Mucke, Oliver Neuschäfer, Simone Pott, Joachim Post, Stephanie Schramm, Dorit Schumann-Bolsche, Bruno Vandemeulebroecke, Torsten Welle and Joern Birkmann, 2016, World Risk Report 2016. [ONLINE] Available at: http://collections.unu.edu/view/UNU:5763. [Accessed September 20, 2016]

Herath, H.M.A, 2015, Place of Women in Sri Lankan Society: Measures for Their Empowerment for Development and Good Governance. Vidyodaya Journal of Management, Vol. 01(1)

Hettiarachchi, M., K. Athukorale, S. Wijekoon and A. de Alwis, 2014, Urban wetlands and disaster resilience of Colombo, Sri Lanka. International Journal of Disaster Resilience in the Built Environment, Vol 5(5), pp.79-89.

International Federation of Red Cross and Red Crescent, 2015, Unseen, unheard: Gender-based violence in disasters Global study. Geneva.

Index for Risk Management. 2016, INFORM country risk profiles for 191 countries. [ONLINE] Available at: http://www.inform-index.org/Countries/Country-profiles/iso3/LKA [Accessed September 20, 2016].

Inter Press Service, 2015, Sri Lanka's Development Goals Fall Short on Gender Equality. [ONLINE] Available at: http://www.ipsnews.net/2015/05/sri-lankas-development-goals-fall-short-on-gender-equality. [Accessed September 20, 2016]

International Union for Conservation of Nature, Sri Lanka and the Central Environmental Authority, 2006. National Wetland Directory of Sri Lanka, Colombo, Sri Lanka

Jayasundere, Ramani, 2009, Understanding Gendered Violence against Women in Sri Lanka. [ONLINE] Available at: http://assets.wusc.ca/Website/Programs/WDP/backgroundPaper.pdf. [Accessed September 20, 2016]

Jayasuriya, Rasika and Brian Opeskin, 2015, The Migration of Women Domestic Workers from Sri Lanka: Protecting the Rights of Children Left Behind. Cornell International Law Journal, Vol. 47

Jayaweera S., 2009, Importance of Planning Guidelines in Landslide Disaster Risk Reduction. [ONLINE] Available at: http://www.nbro.gov.lk/web/images/pdf/publications/symposium2009/importance%20of%20planning%20guidelines%20in%20landslide%20disaster%20risk%20reduction.pdf. [Accessed September 20, 2016]

Kottegoda, Sepali., 2004, Gender Dimensions of Poverty in Sri Lanka. CEPA Briefing Papers , Vol.08

Lankanewsweb, 2015, Deduru Oya, at the brim of total destruction-wake up Good Governance. [ONLINE] Available at: http://lankanewsweb.net/news/environment/item/898-deduru-oya-at-the-brim-of-total-destruction-wake-up-good-governance. [Accessed September 20, 2016]

Law & Society Trust, 2011, Truth Telling, Gender and Commissions of Inquiry in Sri Lanka. Vol. 22 Issue 290

Mahanama, 2015, Flood risk zone mapping of Kelani River basin in North of Colombo City. [ONLINE] Available at: http://www.adpc.net/casita/University%20Network/Sri%20Lanka/Moratuwa%20University/Flood_risk_zone_mapping_of_Kelani.pdf. [Accessed September 20, 2016]

Mallawatantri, A., A. Rodrigo and K. De Silva, 2016. Medium to Long-term Multi-Stakeholder Strategy and Action Plan for Management and Conservation of Kelani River Basin.Central Environment Authority and International Union for the Conservation of Nature Sri Lanka Country Office, Colombo, pp153

Manchanayake,R.M.R.W., 2014. Annual Performance Report. [ONLINE] Available at: http://www.ird.gov.lk/en/publications/Annual%20Performance%20Report_Documents/PR_2014_E.pdf. [Accessed 20 September 2016].

Ministry of Disaster Management, 2011, Integrated Post Flood Assessment May 2010.

Ministry of Environment and Renewable Energy, 2014b, National Action Programme for Combatting Land Degradation in Sri Lanka.: 2015-2024. Ministry of Environment and Renewable Energy. [ONLINE] Available at: http://www.unccd.int/ActionProgrammes/Sri%20Lanka-2015-2024-eng.pdf. [Accessed September 20, 2016].

Ministry of Environment and Renewable Energy, 2014a, Sri Lanka's Fifth National Report to the Convention on Biological Diversity. Biodiversity Secretariat, Ministry of Environment and Renewable Energy

Ministry of Mahaweli Development and Environment, (2015): National Adaptation Plan for Climate Change Impact in Sri Lanka: 2016 to 2025. Climate Change Secretariat, Ministry of Mahaweli Development and Environment. Available at: http://www.climatechange.lk/NAP/NationalAdaptationPlan_RevisedFinal.26.10.2015.pdf. [Accessed on September 26, 2016].

Ministry of Women and Child Affairs, 2014, Report of the opposition's commission on the prevention of violence against women and the girl child. [ONLINE] Available at: http://www.childwomenmin.gov.lk/resources/30/REPORT.pdf. [Accessed September 20 2016]

Ministry of Mahaweli Development and Environment, 2015, National Adaptation Plan for Climate Change Impact in Sri Lanka: 2016 to 2025. Climate Change Secretariat, Ministry of Mahaweli Development and Environment

Ministry of Mahaweli Development and Environment, 2016a, Progress Report 2015 and Action Plan 2016. Ministry of Mahaweli Development and Environment . [ONLINE] Available at: http://www.environmentmin.gov.lk/web/images/pdf/progress_reports/progressreport2015-actionplan2016-english.pdf. [Accessed September 20, 2016]

Muslim Aid Sri Lanka, 2016, Post Disaster Assessment Colombo, Gampaha & Kegalle 2016

National Building Research Organization, 2015, A study on the Resettlement Planning Process Applied in Post Landslide disaster Resettlement Project in Sri Lanka, 6th Annual NBRO Symposium

Neumayer, Eric and Thomas Plümper, 2007, The gendered nature of natural disasters: the impact of catastrophic events on the gender gap in life expectancy, 1981-2002. Annals of the Association of American Geographers,Vol.97 (3)

Oxfam International, Christian Aid, WSPA, Islamic Relief, Plan International UK and Global Network for Disaster Reduction, 2014, Policy Brief: Disasters in the SDGs—A first Response to the Focus Areas proposed by the Co-Chairs

Pathfinder Foundation, 2015, Structural Change of the Sri Lankan Economy and its Policy Implications. [ONLINE] Available at: http://pathfinderfoundation.org/pf-projects/on-going/view-point/260-structural-change-of-the-sri-lankan-economy-and-its-policy-implications. [Accessed September 20, 2016]

Pereira, Kiran & Ranjith Ratnayake, 2013. Curbing Illegal Sand Mining in Sri Lanka. [ONLINE] Available at: http://www.waterintegritynetwork.net/wp-content/uploads/2015/04/Case_SriLanka_SandMining_EN_2013.pdf. [Accessed September 20, 2016].

Perera, Sachith, 2016, The tech you can use to help flood relief efforts. [ONLINE] Available at: http://www.readme.lk/help-flood-relief-efforts/. [Accessed September 20, 2016].

Romeshun, K., V. Gunasekara and M. Munas 2013, Life and Debt: Assessing Indebtedness and Socio-economic Conditions of Conflict Affected Housing Beneficiaries in Jaffna, Kilinochchi and Mullaitivu Districts. Colombo: CEPA. Accessed from http://www.cepa.lk/publications/details/life-and-debt--6377f1421e8fb3231dcd7acf83f451d0.html

Siddhisena, K. A. P., 2003, Marital disruption in Sri Lanka: Trends and differentials. Sri Lanka Journal of Population Studies

The Gazette of the Democratic Socialist Republic of Sri Lanka. 2016. PART I : SECTION (I) — GENERAL Proclamations & C., by the President. [ONLINE] Available at: http://documents.gov.lk/files/egz/2016/6/1970-16_E.pdf. [Accessed September 20, 2016].

Udaya Kantha, K.K.S. and K.E.D. Perera, 2013, Accelerating Inclusive Growth Trends in Sri Lanka: Challenges and Achievements. Social Sciences and Humanities Review, Faculty of Humanities and Social Sciences-University of Ruhuna, vol.01(01)

United Nations Development Programme, 2015, Human Development Report 2015. [ONLINE] Available at: http://hdr.undp.org/sites/default/files/2015_human_development_report.pdf. [Accessed September 20, 2016].

United Nations Central Emergency Response Fund, 2016, Sri Lankan communities affected by flooding and landslides receive support from CERF. [ONLINE] Available at: http://www.unocha.org/cerf/resources/top-stories/sri-lankan-communities-affected-flooding-and-landslides-receive-support-cerf. [Accessed September 20, 2016].

United Nations Programme on Reducing Emission from Deforestation and Forest Degradation, 2015, Summary Report on Drivers of Deforestation and Forest Degradation in Sri Lanka. [ONLINE] Available at: http://redd.lk/web/images/contents/document_centre/communiation_materials/1_Drivers_of_Deforestation_n_Forest_Degradation_in_SL_Summary.pdf. [Accessed September 20, 2016]

Vodopivec, Milan & Nisha Arunatilake, 2008, The Impact of Population Aging on the Labour Market: The Case of Sri Lanka. IZA Discussion Paper, No. 3456

Waste Management Authority, 2015, Present Status of Solid Waste Management System in Western Province. Waste Management Authority (Western. Province)

World Bank, 2013, World Development Report: Risk and Opportunity—Management Risk for Development

World Bank, 2015, Sri Lanka: Ending poverty and promoting shared prosperity-a systematic country diagnostic. [ONLINE] Available at: http://documents.worldbank.org/curated/en/714211468189526474/Sri-Lanka-Ending-poverty-and-promoting-shared-prosperity-a-systematic-country-diagnostic. [Accessed September 20, 2016].

World Bank, 2016, Fiscal Disaster Risk Assessment and Risk Financing Options. [Online]. Available at: https://www.gfdrr.org/sites/default/files/publication/fiscal-disaster-risk-assessment-financing-options.pdf [Accessed September 20, 2016].

Annex 6. International Response - Foreign Donations

Government/INGO/NGO/ Individual	Date of Arrival	Items	Quantity	Units
JICA	21.05.2016	Blankets (Thin)	800	
		Expedition Filter	30	
		Water Purification Tablets	5,000	
		Generator 220V	10	
		Cord Reel 220 V	10	
		Adapter Plugs Set	14	
		Foldable Tank	2,112	
		Water Tank (3700L)	20	
JICA	21.05.2016	Sleeping Mattress	210	PIECES
		Plastic Rolls (Blue) (blankets)	100	PIECES
Government of India	21.05.2016	Tents	700	
		Tarpaulin Sheets	1,000	
		Electric Generators	10	
		Emergency Lamps	100	
		Torches	300	
		Rain coats	1,000	
		Folding Mattress	100	
		Water Filters (120) and life straws (380) along with instruction manual for water purification	120	
Government of India		Medication Against Epidemics 10,000 People	10,000	
Government of India	21.05.2016	Dry Rations		
		Condiments	100	KGS
		Dhal	990	KGS
		Rice Superfine Long Grain	5,000	KGS
		Jam	120	KGS
		Milk Powder	100	KGS
		Salt	200	KGS
		Sugar	400	KGS
		Oil Refined	252	KGS
		Tea	120	KGS
		Fresh Rations		
		Fruit TD	204	KGS
		Vegetable TD	204	KGS

Government/INGO/NGO/ Individual	Date of Arrival	Items	Quantity	Units
		Miscellaneous		
		Mineral Water	9,000	LTRS
		Aerated water	256	LTRS
		Rain Suit blue	833	NOS
		Tent	5	SETS
		Tarpaulin sheets	228	NOS
		Cleaning and Hygiene Material	5,250	KGS
		Hussain Clothes	10,000	MTRS
		Calico Clothes	10,000	MTRS
		Plastic Mugs	1,500	NOS
		Cloth Sponges	5,000	NOS
		Candles	500	KGS
Government of India		Matches Safety	1,200	PKTS
		Trash Bags	10,000	NOS
		Toilet Paper	2,000	PKTS
		Medical Stocks	1	HALF MEDICAL BRICK
		Medical Boxes	17	BOX
KUOK Brothers SDN Berhard-Malaysia	21.05.2016	Tents	220	NOS
(Deputy Director General Turkish Crescent) Republic of Turkey	22.05.2016	Family Living Tents	20	
		Blankets	100	
		Solar Powered Lamp	100	
Islamic Republic of Pakistan	23.05.2016	Tarpaulin Sheets	500	
		Tents	100	
		Mats	500	
		Generators	40	
		Medicine	63	PKGS
		Water Purification Tablets	800	
Islamic Republic of Pakistan	24.05.2016	Tents	330	NOS
Mahakaruna Buddhist Society, Singapore	24.05.2017	Towels	10	Bags
		Blankets	8	Bags
		Children and Adult Cloth	10	Bags
		Diapers	7	Bags
Consul General of Sri Lanka, Dubai, UAE	25.05.2016	Instant Noodles	4	Pallet
		Sanitary Napkins	15	PKGS
Government of Bangladesh	27.05.2016	Water filters	500	NOS
		CTM torch lights	200	NOS
		Medicine	125	BOX
		Generators	10	NOS
		Tarpaulin Sheets	400	NOS
Islamic Republic of Pakistan	26.05.2016	Tents	300	NOS
		Boots	500	NOS
		Rain coats	1,030	NOS
		Medicine (Water Purification Boxes)	9	BOX
		Mosquito Boxes	9	BOX

Government/INGO/NGO/ Individual	Date of Arrival	Items	Quantity	Units
Thisara Wijesgunawardana, Ceylon News Unit, II West Point,328, Bath Road, Hounslow	27.05.2016	Pampers	256	PKTS
		Slippers	1	
		Noodle Packets	41	PKTS
		Tea	2	PKTS
		Baby Soap	2	PACKS
		Baby Shampoo Bottle	3	NOS
		Feeding Bottles (Plastic)	50	
		Milk Powder Tins	18	
		Clothes	2	PKGS
		Sarees	22	
		Shoes	10	
		Biscuits	3	PKTS
		Toothpaste	5	
		Toothbrush	5	
		Candle	35	PKTS
		Coffee Bottle	20	
		Medicine	1	
		Soup	35	
		Sponge Boxes	4	
		Cotton Buds	5	PKTS
		Baby Foods	64	BTL
		Dry Foods	166	
Consul General of Sri Lanka, Dubai, UAE	28.05.2016	Foldable Mattress	100	NOS
Bjorn Steiger Stiftung, Germany	29.05.2016	Mobile Water Purification Plant	1	NOS
Danish Emergency Management Agency, Denmark	30.05.2016	Base Camp Equipment	7	PKGS
Danish Emergency Management Agency, Denmark	31.05.2016	Water Purification Equipment	29	PKGS
People's Republic of China	31.05.2016	Tents	1,000	
		Folding Beds	2,998	
		Sticker	2	BOX
Mahakaruna Buddhist Society, Singapore	31.05.2016	Biscuits for Flood victims	100	BGS
		Drinks	100	BOX
		Hospital Beds	6	PCS
		Wheelchairs and commodes	10	PCS
		Clothes	50	CTN
		Blankets and Towels	100	CTN
		Food items (Noodles)	200	CTN
		Rice	300	BGS
		School Bags	30	CTN
		Plastic Chairs for School	40	PCS
Acting High Commissioner, London	02.06.2016	Water Purification Tablets	200,000	NOS
Mr.Clive Fernando, Dubai	05.06.2016	Dry Ration and Sanitary Items	31	PKGS

Government/INGO/NGO/ Individual	Date of Arrival	Items	Quantity	Units
Bangladesh	05.06.2016	Water Purifier (Filter)	3,000	NOS
		Sarees	26,000	PCS
Government of Bangladesh		Lungi	17,000	PCS
		Baby Garments	25	PKTS
		T-Shirts	38+80	PKTS
		Sanitary Napkins	30,000	PCS
		Water	2,040	BTL (weight of 2 Tons)
		Rain Coats	500	PCS
		Tents	25	PKTS
		Tents accessories	2	PKTS
		Charger Lights	500	PCS
		Mosquito Nets	5	PCS
		Baby Food	3	TONS
		Medicine	2,224	CTN
		Generators (5 KW)	20	NOS
		Generators (15 KW)	10	NOS
		Generators (20 KW)	10	NOS
		Rice	20	TONS
Government of Bangladesh	05.06.2016	Water Purifier	3,000	NOS
		Sarees	26,000	PCS
		Lungi	17,000	PCS
		Baby Garments	25	PKTS
		T-Shirts	118	PKTS
		Sanitary Napkins	30,000	PCS
		Water	6	TONS
		Rain Coats	500	PCS
		Tent	25	PKTS
		Tent Accessories	2	PKTS
		Charger Light	500	PCS
		Mosquito Nets	5	PKTS
Government of Bangladesh		Baby Food	3	TONS
		Medicine	2,224	CTN
		Generator (5KW)	20	NOS
		Generator (15KW)	10	NOS
		Generator (20KW)	10	NOS
		Rice	20	TONS
Bjorn Steiger Stiftung, Germany	06.06.2016	Chlorine Tablets	1	PKGS (67 Kg)
Bjorn Steiger Stiftung, Germany	07.06.2016	Water Purification Parts	1	PKG
Government of Bangladesh	07.06.2016	Clothes (Ready made garments)	52	PKGS
Shelter Box Trust Ltd, United Kingdom	11.06.2016	Shelter Boxes (Tents)	328	BOX (Tents)
Albert George Hettiarachchi, Dubai	11.06.2016	Milk Powder	132	BOX
		Blankets	11	BOX
		Torch Accessories	2	BOX
		Baby Food	9	BOX

Government/INGO/NGO/ Individual	Date of Arrival	Items	Quantity	Units
Brickfields Asia College, Malaysia	14.06.2016	Men's Clothes	86	BOX
		Women's Clothes	88	BOX
		Children's Clothes	34	BOX
		Footwear	26	BOX
		Bags	6	BOX
		Toiletries	30	BOX
		Food/Drinks	56	BOX
		Baby Diapers	32	BOX
		Curtains/Bedding	16	BOX
		Blankets/Mats	16	BOX
		Stationery	8	BOX
		Life Jackets/Jackets	31	BOX
		Gas Stoves	115	BOX
		Toys	5	BOX
		Utensils	3	BOX
		Towels	3	BOX
		Sanitary Pads	20	BOX
		Milo	10	BOX
		Mattress	19	PCS
Next Manufacturing Pvt Ltd, Katunayaka	17.06.2016	T-Shirts	7,000	PCS
Royal College Union in Dubai, UAE	20.06.2016	Noodles	3	PKGS (396 BOXES)
Helios Development (HK) Limited, Hong Kong	22.06.2016	Kitchen Sets	160	SETS (40 CTN)
Premier Cargo Services, K.S.A. Dubai (through Sri Lanka Islamic Centre)	30.06.2016	Food Items	56	PACKS
PT. Markaindo Selaras Kawasan Indstri Sentul (KIS), Bagor, Indonesia	30.06.20160	Aqua Tabs (17mg)	8,000	PCS

Table 124. International Response-Foreign Donations. Source: NDRSC, 22 July 2016.

Annex 7.
Housing, Land and Settlements

District	Improvised Housing						Semi-Permanent Housing						Permanent Housing						Total
	<500 ft²			500≤x<1000 ft²			<500 ft²			500≤x<1000 ft²			500≤x<1000 ft²			≤ 1000 ft²			
	Minor	Partial	Fully	Minor	Partial	Fully	Minor	Partial	Fully	Minor	Partial	Fully	Minor	Partial	Fully	Minor	Partial	Fully	
Colombo			1,396				1,374	8,009	1,397	3,205	8,009		4,807	4,005		2,060			34,262
Kalutara	5		8				16	36	6	22	59	12	104	314	32	15	44		673
Gampaha	3,986	31	127	59	21		3,229	217	639	1,895	163	220	2,939	93	1,734	557	104	1	16,015
Ratnapura	2				5		20	375	58		10		5	81	15				571
Kegalle																1,682	1,845	227	3,754
Nuwara Eliya														75	3				78
Kandy	4	1					21	66		94	87	23	29	96	70	107	263	30	891
Matale														140	12				152
Galle											22			174	13		5	2	216
Matara											30			90	18		3	2	143
Hambantota								8			17				28				53
Anuradhapura									58					92					150
Polonnaruwa		5	1					2		1	10		24	45	1		6	3	98
Puttalam											396		5		88				489
Kurunegala			7	116	104				20		100	20		10					377
Vavuniya											104	32							136
Mannar			16					4	7		3			8					38
Jaffna																192			192
Mullaitivu								168	24					20					212
Kilinochchi		200						51							16				267
Trincomalee														6			12	1	19
Batticaloa														5	10				15
Ampara						2								18					20
Badulla													10	37	3				50
Moneragala														54					54
Total	**3,997**	**237**	**1,555**	**175**	**130**	**2**	**4,660**	**8,936**	**2,209**	**5,217**	**9,010**	**307**	**7,923**	**5,363**	**2,043**	**4,613**	**2,282**	**266**	**58,925**

Household goods calculation breakdown

Improvised Housing				Semi-Permanent Housing				Permanent Housing			
<500ft²		B/W 500 and 1000 ft²		<500ft²		B/W 500 and 1000 ft²		B/W 500 and 1000 ft²		> 1000 ft²	
Kitchen Utensils	1,000	Kitchen Utensils	2,500	Kitchen Utensils	3,000	Kitchen Utensils	3,000	Kitchen Utensils	10,000	Kitchen Utensils	15,000
1 Plastic Table	1,500	1 Plastic Table	1,500	1 Plastic Table	1,500	1 Plastic Table	1,500	Wooden Furniture	55,000	Wooden Furniture	55,000
4 Plastic Chairs	5,000	6 Plastic Chairs	7,500	4 Plastic Chairs	5,000	6 Plastic Chairs	7,500	3 Single Beds	30,000	2 Single Beds	15,000
2 Mattresses	2,000	3 Mattresses	3,000	2 Single Beds	15,000	3 Single Beds	22,500	Radio/CD Player	5,000	1 Double Bed	22,000
Radio	750	Radio	750	2 Mattresses	2,000	3 Mattresses	4,000	TV	30,000	Radio/CD Player	5,000
Cooker	1,500	Cooker	1,500	Radio	1,500	Radio	1,500	Gas Cooker	4,000	TV	30,000
Storage	1,000	Storage	2,500	TV	20,000	TV	20,000	Gas Cylinder	2,500	Gas Cooker	4,000
Others	2,250	TV	20,000	Gas Cooker	4,000	Gas Cooker	4,000	Iron	1,500	Gas Cylinder	2,500
TOTAL	15,000	Kitchen Table	2,000	Gas Cylinder	2,500	Gas Cylinder	2,500	Kitchen Cupboards	24,000	Iron	1,500
		Others	3,750	Iron	1,500	Iron	1,500	Clothes Rack	1,500	Kitchen Cupboards	25,000
		TOTAL	45,000	Coffee Table	1,000	Coffee Table	1,500	2 Wardrobes	30,000	Clothes Rack	1,500
				Storage	2,500	Storage (Excl Kitchen)	2,000	Cabinet	20,000	3 Wardrobes	45,000
				Clothes Rack	1,000	Clothes Rack	1,000	Refrigerator	50,000	Cabinet	20,000
				Kitchen Table	2,000	Kitchen Table and Storage	5,000	Pedestal Fans	22,500	Refrigerator	50,000
				Pedestal Fans	7,500	2 Pedestal Fans	15,000	Study Table and Chair	10,000	Fans/AC	50,000
				Others	5,000	Refrigerator	30,000	Dressing Table	10,000	Study Table and Chair	10,000
				TOTAL	**75,000**	Others	7,500	Outdoor Furniture	10,000	Dressing Tables	18,000
						TOTAL	**130,000**	Others	9,000	Outdoor Furniture	10,000
								TOTAL	**325,000**	PC	50,000
										Telephone Line	13,500
										Washing Machine	45,000
										Others	12,000
										TOTAL	**500,000**

Annex 8. Health Sector

Asset	LKR
Medical Supplies	450,000,000
Vehicles and Forklifts	11,000,000
Wooden Pallets	7,500,000
Total	**468,500,000**

Table 125. Damages-Ministry of Health, Medical Supplies Division, Sub Stores-Kotikawatte.

Item	LKR
Medical Supplies Division (Operation)	840,000
Medical Supplies-Colombo	58,212,000
Medical Supplies-Gampaha	24,703,000
Medical Supplies-Kegalle	21,603,000
Transport of Medical Supplies	1,260,000
Destruction Cost-Medical Supplies	8,400,000
Total	**115,018,000**

Table 126. Losses-Operational cost-Ministry of Health.

Item	LKR
Colombo (Staff and Transport)	1,262,030
Gampaha (Staff and Transport)	560,902
Kegalle (Staff and Transport)	841,353
Medical Supplies	1,000,000
Total	**3,664,285**

Table 127. Operational cost-Ministry of Defence.

Item	Quantity	Value (LKR)
Land suitable for a warehouse in Western Province	1.2 hectares	50 million
Pre-fabricated and heat insulated stores	50,000 sq feet	300 million
A/C system for the pre-fabricated stores	1 unit	150 million
Total		**500 million**

Table 128. Detailed cost breakdown of the proposed MSD Sub Stores-Ministry of Health.

Annex 9. Education

Province	District	Grade 1 New Admissions			Grade 1 with ECCE		
		Male	Female	Total	Male	Female	Total
Western	Colombo	13,992	13,511	27,503	13,529	13,233	26,762
	Gampaha	14,555	14,536	29,091	14,230	14,258	28,488
	Kalutara	9,296	8,989	18,285	8,934	8,444	17,378
	Total	37,843	37,036	74,879	36,693	35,935	72,628
Central	Kandy	10,884	11,015	21,899	9,943	10,261	20,204
	Matale	4,447	4,248	8,695	4,200	4,077	8,277
	Nuwara Eliya	6,804	6,554	13,358	5,904	5,792	11,696
	Total	22,135	21,817	43,952	20,047	20,130	40,177
Southern	Galle	8,933	8,642	17,575	8,772	8,182	16,954
	Hambantota	5,775	5,616	11,391	5,576	5,429	11,005
	Matara	6,888	6,283	13,171	6,533	5,954	12,487
	Total	21,596	20,541	42,137	20,881	19,565	40,446
Northern	Jaffna	3,975	3,865	7,840	3,844	3,742	7,586
	Kilinochchi	1,190	1,174	2,364	1,153	1,131	2,284
	Mannar	998	948	1,946	976	928	1,904
	Mullaitivu	1,107	1,097	2,204	1,098	1,092	2,190
	Vavuniya	1,485	1,376	2,861	1,391	1,319	2,710
	Total	8,755	8,460	17,215	8,462	8,212	16,674
Eastern	Ampara	6,814	6,682	13,496	6,375	6,209	12,584
	Batticaloa	5,083	5,022	10,105	4,734	4,687	9,421
	Trincomalee	4,354	4,113	8,467	4,158	3,997	8,155
	Total	16,251	15,817	32,068	15,267	14,893	30,160
North Western	Kurunegala	14,125	13,635	27,760	13,853	13,437	27,290
	Puttalam	7,377	6,936	14,313	6,951	6,581	13,532
	Total	21,502	20,571	42,073	20,804	20,018	40,822
North Central	Anuradhapura	8,817	8,693	17,510	8,571	8,431	17,002
	Polonnaruwa	3,963	3,850	7,813	3,766	3,652	7,418
	Total	12,780	12,543	25,323	12,337	12,083	24,420
Uva	Badulla	7,318	7,341	14,659	6,738	6,735	13,473
	Monaragala	4,607	4,395	9,002	4,358	4,141	8,499
	Total	11,925	11,736	23,661	11,096	10,876	21,972
Sabaragamuwa	Kegalle	6,701	6,605	13,306	6,278	6,247	12,525
	Ratnapura	9,127	9,096	18,223	8,296	8,265	16,561
	Total	15,828	15,701	31,529	14,574	14,512	29,086
Sri Lanka		**168,615**	**164,222**	**332,837**	**160,161**	**156,224**	**316,385**

Table 129. Grade One New Admissions by Gender & with ECCE-2015.

Province	District	1AB	1C	Type 2	Type 3	Total
Western	Colombo	78	79	149	100	406
	Gampaha	66	106	187	177	536
	Kalutara	49	67	161	140	417
	Total	193	252	497	417	1,359
Central	Kandy	60	161	217	211	649
	Matale	21	67	98	136	322
	Nuwara Eliya	34	89	152	273	548
	Total	115	317	467	620	1,519
Southern	Galle	67	70	118	175	430
	Hambantota	38	65	129	87	319
	Matara	45	71	131	117	364
	Total	150	206	378	379	1,113
Northern	Jaffna	47	44	149	199	439
	Kilinochchi	12	14	37	41	104
	Mannar	15	20	29	69	133
	Mullaitivu	13	9	41	60	123
	Vavuniya	11	22	46	102	181
	Total	98	109	302	471	980
Eastern	Ampara	36	67	150	183	436
	Batticaloa	34	50	106	165	355
	Trincomalee	24	59	100	129	312
	Total	94	176	356	477	1,103
North Western	Kurunegala	75	184	316	308	883
	Puttalam	33	72	160	101	366
	Total	108	256	476	409	1,249
North Central	Anuradhapura	37	96	176	248	557
	Polonnaruwa	24	33	59	131	247
	Total	61	129	235	379	804
Uva	Badulla	45	133	195	225	598
	Monaragala	32	49	120	93	294
	Total	77	182	315	318	892
Sabaragamuwa	Kegalle	49	90	188	206	533
	Ratnapura	59	84	248	201	592
	Total	108	174	436	407	1,125
Sri Lanka		**1,004**	**1,801**	**3,462**	**3,877**	**10,144**

Table 130. Government schools by functional grade-2015.

3.9 - Total (1-13) Students - 2015 (in Govt.Schools)

Province	District	Sinhala Medium			English Medium(Students with primary Education in Sinhala)			Tamil Medium			English Medium(Students with primary Education in Tamil)			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Western	Colombo	168,095	162,659	330,754	6,336	6,735	13,071	17,330	17,488	34,818	565	840	1,405	192,326	187,722	380,048
	Gampaha	166,245	173,164	339,409	2,054	3,369	5,423	8,133	8,627	16,760	242	285	527	176,674	185,445	362,119
	Kalutara	97,585	98,200	195,785	1,053	1,308	2,361	13,402	14,998	28,400	228	356	584	112,268	114,862	227,130
	Total	**431,925**	**434,023**	**865,948**	**9,443**	**11,412**	**20,855**	**38,865**	**41,113**	**79,978**	**1,035**	**1,481**	**2,516**	**481,268**	**488,029**	**969,297**
Central	Kandy	100,839	103,492	204,331	2,519	3,230	5,749	32,208	34,009	66,217	638	1,475	2,113	136,204	142,206	278,410
	Matale	39,830	40,613	80,443	291	305	596	9,157	9,426	18,583	620	647	1,267	49,898	50,991	100,889
	Nuwaraeliya	31,623	33,162	64,785	381	551	932	48,777	48,580	97,357	204	222	426	80,985	82,515	163,500
	Total	**172,292**	**177,267**	**349,559**	**3,191**	**4,086**	**7,277**	**90,142**	**92,015**	**182,157**	**1,462**	**2,344**	**3,806**	**267,087**	**275,712**	**542,799**
Southern	Galle	107,791	108,195	215,986	1,232	1,896	3,128	2,379	2,436	4,815	16	39	55	111,418	112,566	223,984
	Hambantota	63,422	65,237	128,659	880	1,411	2,291	1,297	1,360	2,657	5	5	10	65,604	68,013	133,617
	Matara	79,059	77,785	156,844	1,058	1,344	2,402	3,630	3,693	7,323	35	47	82	83,782	82,869	166,651
	Total	**250,272**	**251,217**	**501,489**	**3,170**	**4,651**	**7,821**	**7,306**	**7,489**	**14,795**	**56**	**91**	**147**	**260,804**	**263,448**	**524,252**
Northern	Jaffna	0	0	0	0	0	0	58,432	60,847	119,279	1,027	1,146	2,173	59,459	61,993	121,452
	Kilinochchi	0	0	0	0	0	0	16,092	16,301	32,393	43	60	103	16,135	16,361	32,496
	Mannar	6	4	10	0	0	0	13,241	13,316	26,557	148	151	299	13,395	13,471	26,866
	Mullativu	789	753	1,542	0	0	0	13,082	13,438	26,520	59	112	171	13,930	14,303	28,233
	Vavuniya	1,648	1,664	3,312	3	1	4	16,905	17,033	33,938	291	277	568	18,847	18,975	37,822
	Total	**2,443**	**2,421**	**4,864**	**3**	**1**	**4**	**117,752**	**120,935**	**238,687**	**1,568**	**1,746**	**3,314**	**121,766**	**125,103**	**246,869**
Eastern	Ampara	28,016	28,522	56,538	229	366	595	52,027	49,930	101,957	886	1,050	1,936	81,158	79,868	161,026
	Batticaloa	0	0	0	0	0	0	64,582	65,773	130,355	167	301	468	64,749	66,074	130,823
	Trincomalee	11,334	11,476	22,810	0	0	0	38,616	38,372	76,988	264	212	476	50,214	50,060	100,274
	Total	**39,350**	**39,998**	**79,348**	**229**	**366**	**595**	**155,225**	**154,075**	**309,300**	**1,317**	**1,563**	**2,880**	**196,121**	**196,002**	**392,123**
North Western	Kurunegala	148,584	147,014	295,598	3,916	4,463	8,379	13,875	15,974	29,849	173	283	456	166,548	167,734	334,282
	Puttlam	60,311	60,877	121,188	888	1,111	1,999	22,033	22,082	44,115	81	222	303	83,313	84,292	167,605
	Total	**208,895**	**207,891**	**416,786**	**4,804**	**5,574**	**10,378**	**35,908**	**38,056**	**73,964**	**254**	**505**	**759**	**249,861**	**252,026**	**501,887**
North Central	Anuradhapura	84,889	86,616	171,505	1,134	1,455	2,589	9,207	9,899	19,106	0	0	0	95,230	97,970	193,200
	Polonnaruwa	37,935	38,056	75,991	219	285	504	4,627	4,644	9,271	6	9	15	42,787	42,994	85,781
	Total	**122,824**	**124,672**	**247,496**	**1,353**	**1,740**	**3,093**	**13,834**	**14,543**	**28,377**	**6**	**9**	**15**	**138,017**	**140,964**	**278,981**
Uva	Badulla	65,806	68,941	134,747	1,114	1,628	2,742	23,413	24,573	47,986	208	189	397	90,541	95,331	185,872
	Monaragala	46,458	48,013	94,471	712	1,102	1,814	2,303	2,335	4,638	0	0	0	49,473	51,450	100,923
	Total	**112,264**	**116,954**	**229,218**	**1,826**	**2,730**	**4,556**	**25,716**	**26,908**	**52,624**	**208**	**189**	**397**	**140,014**	**146,781**	**286,795**
Sabaragamuwa	Kegalle	68,318	69,095	137,413	1,200	1,642	2,842	13,133	13,176	26,309	741	949	1,690	83,392	84,862	168,254
	Ratnapura	93,442	96,509	189,951	1,192	1,651	2,843	12,360	12,744	25,104	45	334	379	107,039	111,238	218,277
	Total	**161,760**	**165,604**	**327,364**	**2,392**	**3,293**	**5,685**	**25,493**	**25,920**	**51,413**	**786**	**1,283**	**2,069**	**190,431**	**196,100**	**386,531**
Sri Lanka		***1,502,025***	***1,520,047***	***3,022,072***	***26,411***	***33,853***	***60,264***	***510,241***	***521,054***	***1,031,295***	***6,692***	***9,211***	***15,903***	***2,045,369***	***2,084,165***	***4,129,534***

Table 131. Students-2015 (in Govt.Schools)

Detailed Budget (in LKR)

		Sub. Total	Activity Total
	Short Term		
1a	Resumption of education services	-	
1b	Provision of uniform, textbooks and teaching-learning materials		
	5000 school students at the rate of LKR 1,200 per child (uniform: LKR 800 and LKR 400 for text books and stationery)	6,000,000	
	Cost of providing teaching and learning materils for 3500 pre-schools children at the rate of LKR 2,500 per child	8,750,000	14,750,000
1c	Repair of WASH facilities in affected schools		
	34 units basic latrine with septic tank and hand washing, at LKR 600,000 per unit	20,400,000	
	18 units of pre-schools toilets at LKR 300,000 Per unit	5,400,000	25,800,000
1d	Provision of lost equipment: funiture, computers, lab equipment, library books etc.		
	Computers 200 at LKR 75,000 per unit	15,000,000	
	Compter table/chairs 200 at LKR 7,500 per unit	1,500,000	
	2000 units (tables and chairs) at LKR 3,000 per unit	6,000,000	
	Science lab equipments 10 sets at LKR 10,000 per set	500,000	
	Musical instruments 15 sets at LKR 30,000 per set	450,000	
	Sports items 10 sets at LKR 50,000 per set	500,000	
	Library books for 10 libraries at LKR 35,000 per library	350,000	
	140 pre-schools at LKR 10,000 per school	1,400,000	25,700,000
1e	Provide psychosocial support to affected students and families		
	Training of 5 persons from each 140 pre-schools and 175 schools		
	Training of teachers and committee members (48 training sessions) at LKR 35,000 per session	1,680,000	
	Implementation support to affected pre-schools and schools at LKR 10,000 per school	3,150,000	4,830,000
	Medium Term		
2a	Reconstruction of partially damaged school buildings		
	Repair partially damaged schools. These schools in general have suffered 10-25% damage to flooring, wall, roof, drainage system and WATSAN facilities. The cost for repair was estimated to range from 0.5 Mn to 1.2 Mn per school. (Average: LKR 850,000)	147,900,000	
	Repairs to partially damaged pre-schools at LKR 300,000 each	21,600,000	169,500,000
2b	Continue to provide psychosocial support		
	Allowance for 2 facilitators in 6 affected districts, 12 months	1,440,000	1,440,000
2c	Review of existing curriculum and textbooks with DRR and resilience perspective		
	1 consultant for 6 months at LKR 200,000 per month	1,200,000	1,200,000
2d	Promote DRR related outdoor action orieted project work for primary, secondary and A/L students		
	Develop Teacher Guide: 4 workshops at LKR 45,000 per workshop	180,000	

		Sub. Total	Activity Total
	Printing of 25,000 Teacher Guides at LKR 200 per copy	5,000,000	
	Development of story books: 10 workshops at LKR 45,000 per workshop	450,000	
	Printing of 10,000 copies of story books at LKR 200 per copy	2,000,000	
	Printing of 8,000 posters at LKR 10 per copy	80,000	7,710,000
2e	Strengthen disaster preparedness and response at the school and community level through school-based/community based DRM training and planning		
	Training workshops: provincial, zonal level		
	1 workshop at 172 zones for emegency focal points at LKR 45,000 per workshop	7,740,000	7,740,000
	Long term:		
3a	Construction of schools recommended for relocation and fully damaged schools		
	1 school over 500 children at LKR 20 Mn per school	20,000,000	
	4 schools with 50-100 children at LKR 8 Mn per school	32,000,000	
	3 schools less than 50 children at LKR 3 Mn	9,000,000	61,000,000
3b	Improving existing policies, guidelines and systems for better safety and DRR preparedness in schools		
	An Inetrnational consultancy will be sought for 45 days at the rate of US$ 300 a day (US$ 13,500)	1,957,500	
	Per diem: US$ 3,000	435,000	
	Transport: US$ 1,400	203,000	
	Total: US$ 17,900	2,595,500	2,595,500
3c	Undertake school vulnerability mapping for all types of hazards and collate them in a central data base or link it with EMIS system		
	Cost for mapping of 10,161 schools at LKR 5,000 per school	50,805,000	
	Development of a software	1,500,000	
3d	Develop an emergency response mechanism at MOE along with a national data base to track damages and losses in the case of an emergency		
	Development of data collection tools, 3 workshops at LKR 45,000 day	135,000	
	Develop of a guidebook on emergency response in education, printing and dissemination: 5 workshops at LKR 45,000 each and printing of 1,000 copies at LKR 200 each	425,000	
	Capacity buiding workshops for emergency focal points: 4 workshops at LKR 45,000 per workshop	180,000	
	Provision of hardware: 9 computers and printers at LKR 150,000 per unit	1,350,000	2,090,000
3e	Using the vulnerability mapping, prepare a report to determine cases in which existing school site needs relocating to safer location.		
	Cost of developing a report by a local consultant in collaboration with NBRO. 45 days at LKR 20,000 a day.	900,000	900,000

		Sub. Total	Activity Total
3f	Strengthen disaster preparedness and response at the school and community level through school-based/community based DRM training and planning		
	1 day workshop at schools facilitated by zonal emergency focal points at 10,161 schools at LKR 3500 per workshop	35,563,500	35,563,500
	Total	**LKR**	**413,124,000**
		US$	**2,849,131**

Annex 10.
Industry and Commerce Sector

Agriculture, Forestry and Fishing	7.9
Growing of Cereals (Except Rice)	0.2
Growing of Rice	0.9
Growing of Vegetables	0.8
Growing of Sugar Cane, Tobacco and Other Non-perennial Crops	0
Growing of Fruits	0.6
Growing of Oleaginous Fruits (Coconut, King Coconut, Oil Palm)	0.8
Growing of Tea (Green Leaves)	0.8
Growing of Other Beverage Crops (Coffee, Cocoa etc.)	0
Growing of Spices, Aromatic, Drug and Pharmaceutical Crops	0.7
Growing of Rubber	0.3
Growing of Other Perennial Crops	0.2
Animal Production	0.6
Plant Propagation and Support Activities to Agriculture	0.1
Forestry and Logging	0.6
Fishing	1.4
Industries	26.2
Mining and Quarrying	2.3
Manufacturing	15.7
Electricity, Gas, Steam and Air Conditioning Supply	1
Water Collection, Treatment and Supply	0.1
Sewerage, Waste, Treatment and Disposal Activities	0.3
Construction	6.8
Services	56.6
Wholesale and Retail Trade, Transportation and Storage, and Accommodation and Food Service Activities	23.2
Information and Communication	0.6
Financial, Insurance and Real Estate Activities Including Ownership of Dwellings	12.3
Professional Services and Other Personal Service Activities	11.8
Public Administration, Defence, Education, Human Health and Social Work Activities	8.7
Equals Gross Value Added (GVA) at Basic Price	90.7
Taxes less Subsidies on Products	9.3
Equals Gross Domestic Product (GDP) at Market Price	100

Table 132 Gross Domestic Product in 2015 by Industrial Origin at Constant (2010) princes. Source: Central Bank of Sri Lanka.[194]

194 *Central Bank of Sri Lanka, 2015, Annual Report 2015, pg. 40*

	Industry & Construction	%	Trade	%	Total	%
Gampaha	32,561	12%	49,081	12%	81,642	12%
Colombo	28,648	11%	56,222	13%	84,870	12%
Kurunegala	27,544	11%	33,995	8%	61,539	9%
Kalutara	15,154	6%	24,790	6%	39,944	6%
Kandy	15,455	6%	26,746	6%	42,201	6%
Galle	11,745	5%	20,119	5%	31,864	5%
Matara	13,296	5%	16,132	4%	29,428	4%
Puttalam	12,866	5%	18,123	4%	30,989	5%
Ratnapura	11,216	4%	19,959	5%	31,175	5%
Anuradhapura	11,048	4%	18,017	4%	29,065	4%
Hambantota	11,647	4%	11,174	3%	22,821	3%
Kegalle	8,772	3%	14,823	4%	23,595	3%
Jaffna	7,887	3%	11,869	3%	19,756	3%
Batticaloa	9,009	3%	11,769	3%	20,778	3%
Ampara	7,057	3%	13,837	3%	20,894	3%
Matale	7,653	3%	10,250	2%	17,903	3%
Badulla	6,138	2%	14,987	4%	21,125	3%
Nuwara Eliya	4,059	2%	11,788	3%	15,847	2%
Polonnaruwa	6,178	2%	8,603	2%	14,781	2%
Monaragala	5,275	2%	8,345	2%	13,620	2%
Trincomalee	3,064	1%	8,273	2%	11,337	2%
Vavuniya	1,722	1%	3,190	1%	4,912	1%
Kilinochchi	1,136	0%	2,449	1%	3,585	1%
Mannar	829	0%	2,059	0%	2,888	0%
Mullaitivu	921	0%	2,015	0%	2,936	0%
Total	**260,880**	**100%**	**418,615**	**100%**	**679,495**	**100%**

Table 133 Enterprises in Industry and Trade sectors by districts.
Source: Census & Statistics-Non-Agricultural Economic Activities in Sri Lanka.

Districts	Damages (LKR)	Losses (LKR)	Count
Colombo (Only in Kaduwela DS division)	600,543,192		57
Batticaloa	17,275,000	12,200,000	130
Kegalle	7,393,500	8,572,755	207
Puttalam	3,423,000	420,000	55
Kalutara	1,538,000		15
Anuradhapura	1,420,300	690,000	13
Nuwara Eliya	1,110,000	1,018,000	7
Kurunegala	1,034,100	470,000	8
Matale	188,298	52,550	2
Ratnapura	162,740		3
Galle	108,000	144,000	7
Grand Total	**634,196,130**	**23,567,305**	**504**

Table 134. Summary of district-wise damages and losses in SMEs.

District	Damage (LKR Mn)	Loss (LKR Mn)	District Totals (LKR Mn)	%
Colombo	1223.83	1544.66	2768.49	47.1
Gampaha	684.89	538.02	1222.91	20.8
Kegalle	316.57	316.57	633.14	10.8
Ratnapura	153.09	153.09	306.18	5.2
Puttalam	420.34	420.34	840.69	14.3
Anuradhapura	51.97	51.97	103.95	1.8
Total	**2,850.70**	**3,024.66**	**5,875.36**	**100**

Table 135. Industry and Commerce informal sector damage and losses for most affected districts. Source: PDNA team.

District	DS division	Ind. & Cons.				Trade				Services							Losses (LKR Mn)		
		Median	Mean	Count	Damages (LKR Mn)	Median	Mean	Count	Damages (LKR Mn)	Median	Mean	Count	Damages (LKR Mn)	Tot Hhs	Total Affected Hhs	% Affected	Ind. & Cons.	Trade	Services
Colombo	Colombo	3	10	3488	42.47	12	45	14562	177.32	4	31	7997	97.38	66174	7921	12.18	31.85	531.95	97.38
	Kolonnawa	3	16	1502	107.05	4	19	3199	228.01	3	9	2501	178.26	44721	31743	71.27	80.29	228.01	133.69
	Kaduwela	4	12	2922	38.79	5	22	4924	65.36	3	14	5645	74.93	64514	8542	13.27	38.79	81.70	56.20
	Homagama	4	11	3201	9.41	5	18	4538	13.34	4	9	4291	12.62	60928	1786	2.94	9.41	16.68	12.62
	Seethawaka	2	5	1631	12.65	3	16	2635	20.44	2	33	2541	19.71	28372	2195	7.76	6.33	15.33	9.86
	Padukka	2	5	754	0.49	2	5	1143	0.75	2	4	1021	0.67	17031	111	0.65	0.25	0.37	0.33
	Maharagama	2	8	2295	0.41	4	18	4130	0.74	3	10	3703	0.66	49380	88	0.18	0.21	0.74	0.50
	Sri Jayawardanapura Kotte	4	17	555	7.94	10	43	2037	29.16	5	16	2064	29.54	26287	3753	14.31	7.94	72.89	36.93
	Thimbirigasyaya	2	10	1078	5.60	7	88	4167	21.65	5	68	4629	24.05	52523	2716	5.19	2.80	37.88	30.06
	Dehiwala	4	18	414	-	6	50	1374	-	5	18	1426	-	22118	0	0.00	0.00	0.00	0.00
	Ratmalana	2	191	548	0.32	4	479	1571	0.92	3	23	1921	1.13	24155	142	0.59	0.16	0.92	0.85
	Moratuwa	3	7	5255	-	3	14	3795	-	2	7	3869	-	40152	0	0.00	0.00	0.00	0.00
	Kesbewa	3	8	2894	0.52	4	17	4271	0.76	3	7	4383	0.78	62400	111	0.18	0.39	0.76	0.59
Gampaha	Negombo	3	10	1612	4.67	5	29	3781	10.95	3	11	3001	8.69	34103	986	2.90	3.50	13.69	6.52
	Katana	3	6	3029	17.21	3	10	4603	26.15	2	4	6022	34.21	69422	3941	5.68	12.91	19.61	17.10
	Divulapitiya	3	8	3918	3.40	3	14	3404	2.96	2	6	2948	2.56	38605	335	0.87	2.55	2.22	1.28
	Mirigama	2	10	2172	0.64	2	14	2949	0.87	2	5	2274	0.67	42509	125	0.29	0.32	0.43	0.33
	Minuwangoda	2	21	2748	1.23	3	9	3835	1.71	2	6	3051	1.36	46527	207	0.45	0.61	1.28	0.68
	Wattala	3	9	1375	31.58	5	26	3119	71.65	3	11	2520	57.89	42467	9716	22.97	23.69	89.56	43.41
	Ja-Ela	2	10	2342	13.67	3	12	4450	25.98	2	8	4451	25.98	51785	3020	5.84	6.84	19.48	12.99
	Gampaha	3	7	2900	10.19	3	29	4777	16.78	3	9	4843	17.01	50812	1782	3.51	7.64	12.59	12.76
	Attanagalla	2	7	2763	4.37	3	13	3931	6.22	2	5	3505	5.55	44899	710	1.58	2.19	4.67	2.77
	Dompe	2	12	2147	8.05	3	9	2978	11.16	3	7	2701	10.12	39233	1468	3.75	4.02	8.37	7.59
	Mahara	2	6	2599	1.50	2	8	3653	2.11	2	6	3362	1.95	52335	302	0.58	0.75	1.06	0.97
	Kelaniya	3	13	1315	30.61	4	19	2902	67.55	3	8	2758	64.20	32686	7585	23.28	22.96	67.55	48.15
	Biyagama	3	9	1995	19.65	3	17	3374	33.23	2	7	3109	30.62	47934	4691	9.85	14.73	24.92	15.31
					372.43				835.76				700.53				281.12	1252.66	548.87
	Total											**Damage**	**1,908.72**	**2082.66**					

195 *Estimated turnover in 100,000's*

Table 136. Damages and losses in informal sector.

District	Informal sector (in '000)		Total nos (in '000)	% affected	Affected No of Industry	Affected No of Services	Industry		Services	
	Industry	Service					Damages	Losses	Damages	Losses
Puttalam	54.23	85.89	140.12	0.06	3,253.8	5,153	162,676,800.00	162,676,800.00	257,666,400.00	257,666,400.00
Kegalle	68.6	89.68	158.28	0.04	2744	3,587	137,208,960.00	137,208,960.00	179,363,520.00	179,363,520.00
Ratnapura	71.14	81.96	153.1	0.02	711.4	1,639	71,136,240.00	71,136,240.00	81,955,440.00	81,955,440.00
Anuradhapura	30.65	73.3	103.95	0.01	613	733	15,323,880.00	15,323,880.00	36,648,720.00	36,648,720.00
Total							**386,345,880.00**	**386,345,880.00**	**555,634,080.00**	**555,634,080.00**
Grand total										**1,883,959,920.00**

Table 137. Damages and losses in informal sector in Puttalam, Kegalle, Ratnapura and Anuradhapura districts.

Sector	Sub sector	Colombo		Gampaha		Ratnapura		Kegalle	
		D	L	D	L	D	L	D	L
Manufacturing	Food and Beverage	1721.65	150.00	5158.30	5750.00	0.35		3.62	
	Printing and packaging	231.93	15.00			0.43		0.07	
	Wooden products and furniture	5.09		0.12				1.04	
	Non metallic products	251.06	0.50	1.00				2.24	
	Paper			4.04					
	Other	216.24		0.04					
Retail and wholesale	Home appliances	2.91							
	Exports	4.00							
	Apparel	391.95		5.12				0.06	
	Steel	20.10		0.00					
	Pharmaceutical	47.66		0.60				0.10	
	FMCG	110.02		0.39				6.39	
	Motor Vehicle Sales	445.15		5.14		0.05		0.40	
	Other	970.41	52.55	1.31				21.80	
Services	Education	0.44		4.87					
	Security Services	0.21		0.00					
	Logistics	176.34							
	Finance	7.24		4.61				0.82	0.82
	Restaurants								
	Tele-Communication	75.04		0.05					
	Hospitality	233.29		3.25		0.17		1.92	
	Engineering								
	Other	100.26	10.00	372.47	1.25			21.86	
Construction & Engineering		1076.51	28.93	50.58		11.30		10.73	7.13
Sector not defined								11.90	0.47
District-wise damages and loss		6087.49	256.98	5611.89	5751.25	12.29		82.94	8.41
District Totals		**6344.47**		**11363.14**		**12.29**		**91.35**	

	Puttalam		Anuradhapura		District not specified		Other Districts		Total		
	D	L	D	L	D	L	D	L	D	L	Total
	0.28				759.97	10.36			7644.16	5910.36	13,554.52
							4.95	0.00	237.37	15.00	252.37
									6.25	0.00	6.25
					1195.17				1449.47	0.50	1449.97
					5.03				9.06	0.00	9.06
									216.29	0.00	216.29
			1.00						3.91	0.00	3.91
					3805.15				3809.15	0.00	3809.15
	0.03		6.12		7.66		0.82		411.76	0.00	411.76
					3.42				23.52	0.00	23.52
					201.02				249.38	0.00	249.38
	0.18				0.14		0.10	2.00	117.22	2.00	119.22
			0.02		70.25				521.01	0.00	521.01
	1.30				0.79		1.80		997.40	52.55	1049.95
					597.58				602.89	0.00	602.89
									0.21	0.00	0.21
					10.49				186.83	0.00	186.83
					36.28		0.00	2.00	48.93	2.81	51.75
							2.00		2.00	0.00	2.00
					15.30		2.00	0.75	92.39	0.75	93.14
	0.02		0.20		27.33	3.00			266.18	3.00	269.18
								1.00	0.00	1.00	1.00
					0.06				494.65	11.25	505.90
	8.18		5.18		81.29		40.19	2.50	1283.97	38.55	1322.53
	0.00		0.02		353.24		5.62	7.20	370.78	7.67	378.44
	9.98		12.55		7170.17	13.36	57.47	15.45	19044.78	6045.45	25090.23
		9.98		12.55		7183.54		72.91		25090.23	

Table 138. Industry and commerce insured damage and losses in LKR millions
Source: Insurance Board of Sri Lanka and PDNA team

Annex 11.
Irrigation Sector

DISTRICT	DIVISION	DAMAGED ITEMS	ESTIMATED DAMAGE LKR million	TOTAL LKR million
Anuradhapura	Anuradhapura	Headwork (bunds)	15.00	
		Canals including structures (Turnouts, bridges, anicuts, retaining walls etc)	65.00	100.00
		Irrigation Roads	20.00	
	Nachchaduwa	Headwork (bunds)	5.00	
		Canals including structures (Turnouts, bridges, anicuts, retaining walls etc)	20.00	25.00
	Rajanganaya	Canals including structures (Turnouts, bridges, anicuts, retaining walls etc)	45.00	60.00
		Irrigation roads	15.00	
	Total			185.00
Puttalam	Puttalam	Headwork (bunds/sluice/spill)	-	
		Anicut bunds	20.00	
		Canals including structures (Turnouts, anicuts, retaining walls etc)	180.00	300.00
		Irrigation roads	100.00	
	Inginimitiya	Headwork (Aandarawewa gates)	6.00	20.00
		Anicut (gates & spill)	14.00	
	Total			320.00
Kurunegala	Galgamuwa	Headwork (tank bunds & spill)	10.00	40.00
		Anicut bunds	8.00	
		Canals including structures (Turnouts, anicuts, retaining walls etc)	16.00	
		Irrigation roads	6.00	
	Hiriyala	Headwork (tank bund)	4.00	10.00
		Canals including structures (Turnouts, anicuts, retaining walls etc)	6.00	
	Total			50.00
Vavuniya		Headwork (tank bund)	25.00	
		Canals including structures (Turnouts, anicuts, retaining walls etc)	100.00	
	Total			125.00
Monaragala		Headwork (tank bund)	10.00	
		Canals including structures (Turnouts, anicuts, retaining walls etc)	20.00	
		Roads	10.00	
	Total			40.00
Colombo		Major flood control gate	40.00	
		Minor flood protection structures	15.00	
		River bank erosion rectifications	15.00	
	Total			70.00
Gampaha		Major flood bund bank protection	25.00	
		Minor flood protection structures	25.00	
		River bank erosion rectifications	20.00	
	Total			70.00
Ampara	Pottuvil	Headwork (bunds)	35.00	
		Canals including structures (Turnouts, bridges, anicuts, retaining walls etc)	550.00	
		Irrigation Roads	60.00	645.00
Total				**1505.00**

Table 139. Flood Damage for Irrigation Infrastructures. Source: Irrigation Department.

Annex 12. Transport Sector

District	Description	Damage (LKR million)
Puttalam	Repair to washed shoulder. Bridge approaches gabion construction. Repair to embankment erosion.	36
Kurunegala	Repair to washed shoulder. Bridge approaches repair to damaged bridge & washed by pass.	82
Monaragala	Repair to washed by pass. Damaged culvert.	2.2
Badulla	Removal of minor earth slip, rocks fallen & road cleaning.	0.2
Batticaloa	Pot hole patching & rectification Correcting of base failure, chip sealing Culvert reconstruction.	54.63
Trincomalee	Pot hole patching & rectification. Correcting of base failure, chip sealing. Culvert reconstruction.	57
Ampara	Construction of damaged road base by ABC material. Construction of shoulder & embankment. Construction of culverts, gabion & rip rap protection. Road patching by cold mix.	53.8
Colombo	Pot hole patching, edge & shoulder correction, raising with ABC material & overlaying Parapet walls construction, gabion construction & rubble packing to river embankment damage.	707.79
Gampaha	Repair to surface damage, pot hole patching, chip sealing, clearing side drains & asphalt overlaying.	83.3
Kalutara	Boulder packing & shoulder construction at eroded sections, pot hole patching & rectification, asphalt overlaying, construction of a lead away drain, road raising & culvert reconstruction.	16.27
Kegalle	Road cleaning, removal of earth slips & fallen trees, gabion & retaining wall construction, culvert reconstruction. Repair to road settlement surface cracking. Asphalt overlaying. Repair to embankment erosion. Repair to damaged bridge hand rail. Construction of built up drains.	163.13
Ratnapura	Repair to damaged road surface, edge & shoulder, pot hole patching, road settlement repair, pavement rectification. Retaining wall construction for embankment failures. Removal of earth slips, boulders & fallen trees.	25.43
Matara	Gabion wall construction.	44
Galle	Widening & improvement, Road raising & Asphalt overlaying, construction of retaining walls, reconstruction of damage culverts.	182.5
Hambantota	Removal of earth slip & road cleaning.	0.3
Kilinochchi	Gravel surfacing. Metaling of washed off sections. Shoulder rectification. Reconstruction of damage culverts.	1.8
Mullaitivu	Construction of retaining walls.	15
Mannar	Pot hole patching, correction of base failure & surfacing work.	7
Vavuniya	Gravel & ABC overlaying, sand sealing.	10.5
Jaffna	Pot hole patching, shoulder rectification repairing retaining wall, ABC laying.	39
Kandy	Removal of earth slips, boulders blasting & road cleaning, Culverts & side drains cleaning. Reconstruction of damaged culverts, retaining wall, gabion walls & slope failure correction. Shoulder filling, edge correction, Rectification by Asphalt, sand sealing, crack sealing.	337.7
Matale	Construction of the Gabion wall, retaining wall, side drains, built up drains. Reconstruction of culverts, head wall & base failure. Removal of earth slips.	25
Nuwara Eliya	Removal of earth slips, desilting of culverts, reconstruction of damaged road base, construction of retaining wall. Built up drains. Rectification & sand sealing.	110.92
Anuradhapura	Embankment filling, shoulder & asphalt surface rectification, pothole patching. Construction of a bridge, retaining walls, cell box culverts, pipe culverts. Gravel priming, sand sealing, road raising & overlaying, repair to a bridge damage.	162.51

Table 140. District-wise recovery needs in detail for RDA roads.

Annex 13.
Power Supply Sector

District	Damages	LKR
Colombo	Distribution lines, meters, MCCB	4,961,955.00
	Distribution lines, meters, MCCB, Electricity poles	3,380,540.00
	Electrical poles, Distribution lines, meters	1,189,000.00
	Electricity poles, fixing tools	103,858.00
		9,635,353.00
Gampaha	Meters, distribution lines, Electricity poles	4,000,000.00
	Gantries, meters, distribution lines, Electricity poles	4,500,000.00
	Meters, electricity poles, distribution lines, gantries	8,400,000.00
	Meters	8,060.00
	Gantries, Electricity poles, distribution lines, breakers, fuse, generators	181,488.00
	Electricity poles, distribution lines, breakers, fuse, meters	349,031.00
	Transformers, Electricity poles, distribution lines, breakers, fuse	4,018,520.00
	Electricity poles, meters, distribution lines	342,708.00
		21,799,807.00
Kalutara	Electricity poles, Distribution lines	1,416,215.00
	Distribution lines	152,750.00
		1,568,965.00
Ratnapura	Medium voltage poles	1,149,306.67
	Low voltage poles	3,002,400.00
		4,151,706.67
Kegalle	Transformers	3,218,693.33
	Distribution lines	1,235,200.00
	Electricity poles	5,493,693.33
	Low voltage distribution lines	2,025,000.00
	Service lines	1,500,000.00
	Electricity poles , distribution lines	150,000.00
		11,597,586.66
Kandy	Electricity poles	20,000.00
Matale	Low voltage distribution lines	3,066,800.00
	Service line	710,000.00
	High voltage distribution lines	1,098,060.00
	Meters	35,000.00
		4,909,860.00
Nuwara Eliya	Electricity poles, meters, distribution lines	207,995.00
	Transformers, Electricity poles, RC	1,897,110.00
		2,105,105.00

District	Damages	LKR
Galle	Electricity poles, distribution lines, other equipment	971,364.00
	Electricity poles, distribution lines, other equipment, transformers	1,299,785.00
	Electricity poles, ABC conductors, other Infrastructure	375,670.00
	Low voltage distribution lines, service lines	390,505
	Low voltage distribution lines, service lines, electricity poles	2,594,065.00
	Service lines, other infrastructure	16,400.00
	High voltage distribution lines. Low voltage distribution lines. service lines. electricity poles	1,186,000.00
	Electricity poles	400,000.00
	Service lines. Electricity poles	473,000.00
		7,706,789.00
Matara	High tension power tower	5,700,000.00
	High voltage distribution lines. Low voltage distribution lines, service lines, electricity poles	8,958,393.00
	Electricity poles	4,027,375.96
	Low voltage distribution lines, electricity poles	1,654,171.33
	Low voltage distribution lines, service lines, Electricity poles	100,456.00
		20,440,396.29
Hambantota		12,523,415.80
Badulla		4,137,000.00
Monaragala	Electricity poles	152,000.00
	Other	648,963.00
		800,963.60
Kurunegala	Medium voltage distribution lines, Low voltages distribution lines	10,700,000.00
	Low voltage distribution lines	5,375,000.00
	Medium voltage distribution lines, Low voltages distribution lines, transformers	3,925,000.00
		20,000,000.00
Puttalam	Low voltage distribution lines	10,550,000.00
	Low voltage distribution lines, transformers	4,450,000.00
		15,000,000.00
Anuradhapura	Electricity poles, distribution lines, transformers,	3,312,512.00
	Low and High Voltage distribution lines, meters	4,960,005.00
		8,272,517.00
Polonnaruwa	Low and High Voltage distribution lines, high voltage service line, meters, transformers	6,364,784.00
Trincomalee	Low voltage distribution lines	40,000.00
	Transformers, medium voltage electricity poles	2,100,000.00
	Transformers	820,000.00
		2,960,000.00
Ampara	Transformers	680,000.00
Total Damage for CEB for Infrastructure		**154,674,249.02**

Table 141. Infrastructure Damages to Electricity Sector in CEB areas, district-wise.

	LKR million
Meters, Distribution lines, Poles and Transformers	52.99

Table 142. Infrastructure Damages to Electricity Sector in LECO areas.

Annex 14. Environment Sector

Legislation	Implementing Agency
National Environmental Act No. 47 of 1980-Provides overall environmental protection legislation, including licensing procedures, environmental standards and project approval procedures (EIA/IEE).	Central Environment Authority
Fauna and Flora Protection Ordinance No. 2 of 1937-Provides for the conservation of wildlife, which have been declared as protected species. Empowers the Minister to declare any area of State Land as a National Reserve or Sanctuary.	Department of Wildlife Conservation
Forest Ordinance No. 16 of 1907-Consolidates the laws relating to forests and to the felling and transportation of timber. Empowers the Minister to declare any area of State land as a Reserved Forest, Conservation Forest.	Forest Conservation Department
National Heritage Wilderness Areas Act No. 3 of 1988-Provides for the declaration, protection and preservation of any area of State land with unique ecosystems, genetic resources or outstanding natural features as National Heritage Wilderness Areas.	Forest Conservation Department
State Lands Ordinance No. 8 of 1947-Provides for how State Lands and their resources, including lakes, rivers and streams, should be allocated, used and managed. Also provides for the declaration of State reservations.	Ministry of Lands
Mahaweli Authority of Sri Lanka Act No. 23 of 1979-provides for the conservation and maintenance of the physical environment of Mahaweli Areas, including watershed management, soil erosion and the protection of reservation areas.	Mahaweli Authority
Water Resources Board Act No. 29 of 1964-promotion of afforestation, preventing the pollution of rivers, streams and other water courses, and formulation of national policies relating to the control and use of water resources of the country.	Water Resources Board
Soil Conservation Act No. 25 of 1951-Provides for the conservation of soil resources, mitigation of soil erosion and the protection of lands against flood and drought.	Ministry of Agriculture
Flood Protection Ordinance No. 4 of 1924 (as amended)-provides for the protection of areas from flood damage and empowers the Director of Irrigation to declare any area as a flood area.	Ministry of Irrigation
Control of Pesticides Act No. 33 of 1980-provides for the licensing and regulation of the import, packing, labelling, storage, formulation, transportation, sale and use of pesticides.	Registrar of Pesticides
Municipal Councils Ordinance No. 29 of 1947-Provides for the establishment of Municipal Councils and outlines their powers, duties and responsibilities in relation to the built environment and maters such as waste disposal and sanitation.	Municipal Councils
Urban Councils Ordinance No. 61 of 1939-Provides for, duties and responsibilities in relation to the built environment and maters such as waste disposal and sanitation.	Urban Councils
Pradeshiya Sabha Act No. 15 of 1987-outlines their powers, duties and responsibilities in relation to the built environment and maters such as waste disposal and sanitation.	Pradeshiya Sabha
Urban Development Authority Law No. 41 of 1978-Empowers the Urban Development Authority (UDA) to regulate and manage the urban environment including wetlands under their preview.	Urban Development Authority
Sri Lanka Land Reclamation and Development Corporation Act No. 15 of 1968-empowers the Sri Lanka Land Reclamation and Development. Corporation (SLLR&DC) to reclaim low-lying lands and wetlands.	Sri Lanka Land Reclamation

Table 143. Important Environmental legislations and authorities in charge of its implementation.

Annex 15. Disaster Risk Reduction

Total humanitarian relief expenditure during the disaster period

The costs in Table 144 were funded through the UN CERF and included activities related to procurement of relief items, transportation of the items to districts, labour costs, assembly, warehouse charges and other incidentals in the sectors of WASH, Livelihoods, Shelter, Protection, Psycho-social support, Education, Logistics, Food Security, NFIs, Health & Nutrition, Early Recovery (July 1, 2016 onwards) and Multi-Sector Rapid Needs Assessment

UN Agencies = 6
I/NGOs = 10
Private sector network-1 (A-PAD)
Red Cross Movement = 1 (separately indicated)

Agency Name	Districts	Sector	Costs related to activities (LKR)	Staff cost for the duration (LKR)	Total Cost (LKR)
WHO through MoH	All 22 districts	Health	100,866,500	0	100,866,500
UN-Habitat	Colombo	NFIs	24,468,750	2,056,970	26,525,720
	Gampaha	NFIs	24,468,750	2,056,970	26,525,720
	Colombo	Shelter	39,208,000	3,085,455	42,293,455
	Gampaha	Shelter	34,974,000	3,085,455	38,059,455
IOM	Kegalle, Ratnapura	Shelter/NFIs	23,430,418	1,078,683	24,509,101
UNICEF	Colombo, Gampaha, Kegalle, Ratnapura	WASH			166,446,666
	Colombo, Gampaha, Kegalle, Ratnapura	Child Protection			11,679,242
WFP	Colombo, Gampaha, Kegalle, Ratnapura	Food Security			110,418,905
UNFPA	Colombo, Gampaha, Kegalle, Ratnapura, Jaffna, Kilinochchi	HEALTH	18,429,000		18,429,000
ZOA	Kilinochci	NFIs	75,000	25,000	100,000
	Kilinochci, Mannar, Vavuniya	Rapid assessment		35,000	35,000
Handicap International	Colombo	Food security	17,190,000	5,964,545	23,154,545
	Gampaha	Food security	7,162,500	2,485,227	9,647,727
	Kegalle	Food security	2,865,000	994,091	3,859,091
	Ratnapura	Food security	1,432,500	497,045	1,929,545
ChildFund Sri Lanka	Puttalam	Psycho-social support	976,000	225,000	1,201,000
	Puttalam	NFIs	490,000	112,000	602,000
	Puttalam	Education	253,000	58,000	311,000
	Puttalam	Food Security	150,000	34,000	184,000
	Mullaitive	Logistics	0	35,000	35,000

Agency Name	Districts	Sector	Costs related to activities (LKR)	Staff cost for the duration (LKR)	Total Cost (LKR)
A-PAD SL	Colombo, Gampaha, Kegalle	WASH	1215389	0	1,215,389
	Colombo, Gampaha, Kegalle	Food Security	1,545,504	0	1,545,504
	Colombo, Gampaha, Kegalle	NFIs	1,915,962	0	1,915,962
	Colombo, Gampaha, Kegalle	Health & Nutrition	162,463	0	162,463
	Colombo	Early Recovery	1,923,305	0	1,923,305
OXFAM	Kegalle	WASH	2,497,446.00	99,485	2,596,931
	Ratnapura	WASH	1,321,079.00	181,985	1,503,064
	Colombo	WASH	1,056,572.00	99,485	1,156,057
		Food security/ Livelihood	4,757,205.00	297,920	5,055,125
	Gampaha	WASH	-	24,485	24,485
	Puttalam	WASH	790,000.00		790,000
	Kegalle	Rapid assesment		60,000	60,000
Care International	Kilinochchi	Food Security	1,131,382.00	34,546	1,165,928
		Gender analysis	63,290.00		63,290
	Mannar	Food security	839,303.00	34,546	873,849
		Gender analysis	63,290.00		63,290
ACTED	Colombo	Early Recovery	60,000	63,110	123,110
Save the Children	Kegalle	NFIs	900,576	600,040	1,500,616
	Colombo	NFIs	2,870,028	1,800,000	4,670,028
	Kegalle	Protection	3,060,970	600,500	3,661,470
	Colombo	Education	1,000,000	105,000	1,105,000
World Vision Lanka	Kegalle	WASH	20,148,915	800,305	20,949,220
	Kegalle	Education	1,122,464		1,122,464
	Colombo	WASH	1,352,515		1,352,515
	Kegalle	Protection	9,776,583	737,881	10,514,464
	Colombo	NFIs	2,317,247		2,317,247
	Kegalle	NFIs	1,864,420		1,864,420
	Kegalle	Psycho-social support		582,040	582,040
	Kegalle	Camp Management	3,750,146		3,750,146
	Kegalle	DRR	509,285		509,285
	Gampaha	WASH	6,361,988		6,361,988
	Gampaha	Education	35,440,146		35,440,146
	Gampaha	Shelter	29,975		29,975
Islamic Relief	Colombo	Food Security	3,214,132	185,554	3,399,686
Plan International Sri Lanka	Colombo	Education	17,000,000	0	17,000,000
TOTAL					**743,181,135**

Table 144. Total humanitarian response (May 14-June 30, 2016) funded through UN CERF.

Districts	Sector	Costs related to activities (LKR)	Staff cost for the duration (LKR)	Total Cost (LKR)
Kegalle/Colombo/ Gampaha/Puttlam/ Kurunegala	NFI	27,756,030	0	27,756,030
	Shelter	2,147,040	0	2,147,040
	WASH & Health and care	1,775,994	0	1,775,994
	Dis. Preparedness & Search & Rescue	3,242,925	0	3,242,925
	Sub-Total Humanitarian Response			**34,921,989**
	NFI	34,117,041		34,117,041
	WASH	15,750,945		15,750,945
	Health and care	12,527,648		12,527,648
	Dis. Preparedness	6,719,937		6,719,937
	Sub-Total-Early Recovery			**69,115,571**
	Grand Total			**104,037,560**

Table 145. International Federation of Red Cross and Red Crescent Societies Contribution.

Annex 16. Employment and Livelihoods

Estimation of Livelihood Impacts

Calculation of livelihood impact was carried out by using mostly the national data produced by DCS and while using any reliable secondary data collected and compiled by line Ministries or other institutions after the May 2016 disaster, where possible. A more detailed account of the calculations used is given in this Annex.

District	Population (thousand)	Employed population (thousand)
Colombo	2,375	950
Gampaha	2,354	941.6
Puttalam	790	316
Kegalle	861	344.4
Ratnapura	1127	450.8
Anuradhapura	893	357.2

Table 146. Employed population in priority districts.

Economically active population in Sri Lanka is around 40 percent (Table 89) and for the purpose simplifying analysis of this chapter an equal distribution of employed population across districts is assumed.

District	Employed Population by Major Industry Group			Total
	Agriculture	Industry	Service	
Colombo	17.49	269.13	684.97	971.59
Gampaha	44.30	373.64	545.06	963.00
Puttalam	84.03	92.43	146.40	322.86
Kegalle	82.77	116.94	152.87	352.58
Rathnapura	199.63	121.25	139.70	460.58
Anuradhapura	188.14	52.24	124.94	365.32
	616.36	**1025.64**	**1793.93**	**3435.93**

Table 147. Employed population (thousands) by major industry group in priority districts-2014.

Table 147 was derived by using district wise employed population and distribution of the employed population across major industry groups given in the Table 94.

It is assumed that national average of 60 percent employment in informal sector (Table 91) is valid across each district and 60 percent of total number of employed population given in the Table 96 are in informal sector. On this basis, Table 95 presents numbers of people in informal sector employment and distribution of informal sector employment across major industry groups in each district.

As presented in the executive summary, nearly 500,000 people affected due to the May 2016 disasters, of which the majority reported from Colombo and Gampaha districts. Table 148 below shows the district wise affected population in six priority districts and % affected in each district.

District	Total Population	Number of affected population	% affected
Colombo	2,375,000	228,871	9.64
Gampaha	2,354,000	74,003	3.14
Puttalam	790,000	42,881	5.43
Kegalle	861,000	34,833	4.05
Rathnapura	1,127,000	18,154	1.61
Anuradhapura	893,000	4,729	0.53

Table 148. District wise affected population.

Assuming that affected population is distributed equally in all employment sectors, number of people in informal sector affected by disasters can be estimated, which is presented in Table 96.

Table 95 provides a further breakdown of information presented in the Table 96 to employment status. Employment status of informal sector in each district was calculated by using proportions given in Table 92.