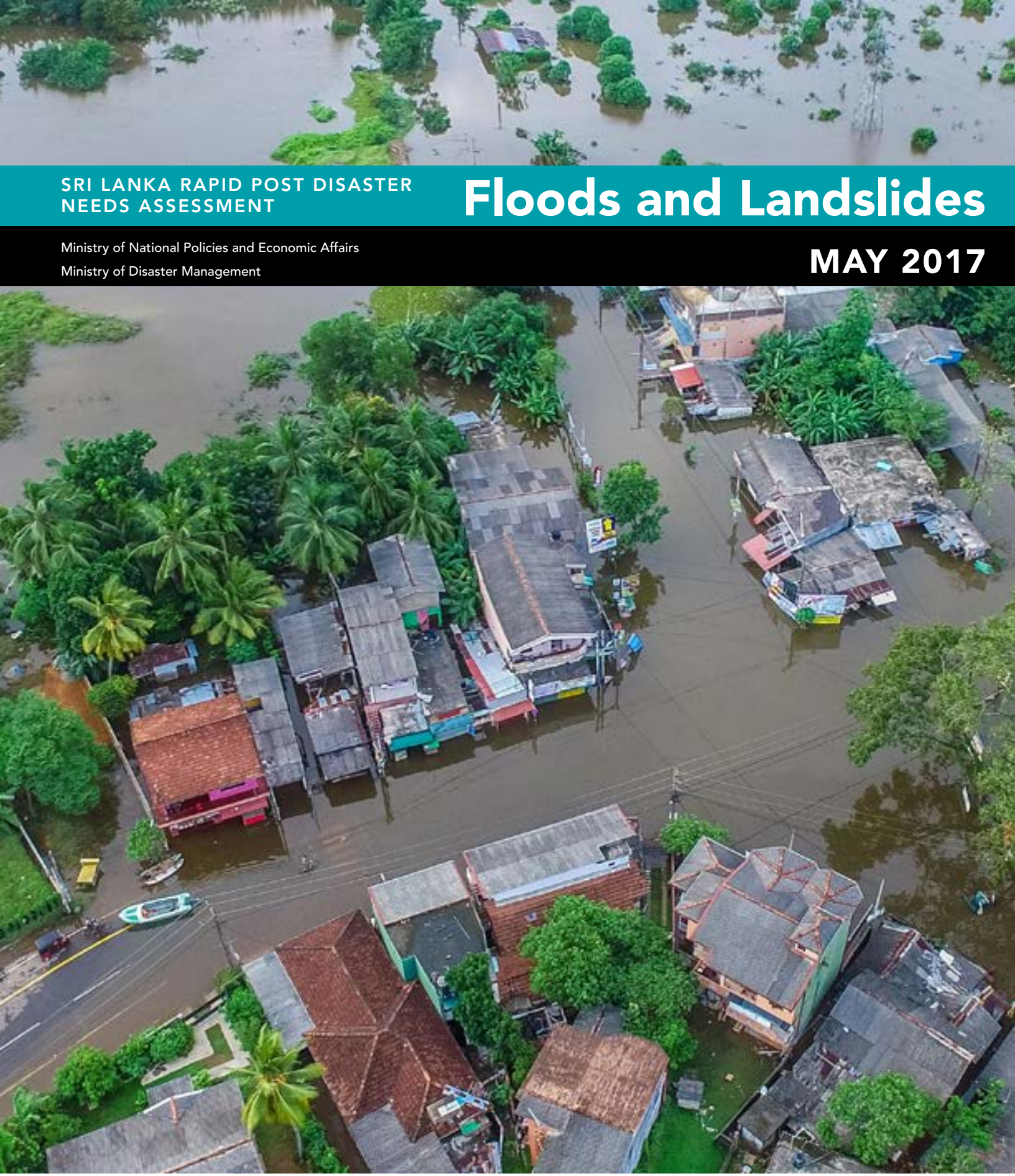
SRI LANKA RAPID POST DISASTER NEEDS ASSESSMENT

Floods and Landslides

Ministry of National Policies and Economic Affairs

Ministry of Disaster Management

MAY 2017



UNITED NATIONS SRI LANKA

WORLD BANK GROUP

EUROPEAN UNION

GFDRR Global Facility for Disaster Reduction and Recovery

Sri Lanka Rapid Post Disaster Needs Assessment Floods and Landslides, May 2017

ISBN 978-955-0897-05-6

Published by the Ministry of Disaster Management & Ministry of National Policy and Economic Affairs in collaboration with the United Nations, World Bank and European Union.

September 2017

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Photo Credits: European Press Photo Agency, Indian Express, Reuters, United Nations, Asian Tribune, Amila Weerasinghe, Rainforest Protectors of Sri Lanka.

Contents

Foreword

Sri Lanka was once again affected by severe floods and landslides, in May 2017. While the spread of disaster situation was confined only to 15 districts compared to the 24 districts in the previous year, increased incidents of landslides and deaths in 2017 made the situation equally challenging.

The disaster was triggered by heavy rain and high winds brought about by the southwest monsoon on 25th and 26th May affecting 879,778 people with 219 deaths and 74 missing. The disaster caused destruction and damaged nearly 80,000 houses and affected livelihood of over 342,000 people dependent on agriculture, trade, and industry. The Ministry of Disaster Management and District and Divisional Secretariats led the extensive rescue and relief operations with the support of the Sri Lankan Army, Navy and Air Force, Media, CSOs, private sector and individuals.

A post disaster needs assessment was initiated as moved out of emergency/relief phase. In response to the request of our government, the United Nations, the World Bank and the European Union provided support to the PDNA 2017, while this year's assessment was carried out using the local capacity build on the internationally accepted methodology last year.

The Rapid 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 supported by national experts and the young graduates who were coordinated by the University of Colombo.

The report was produced within 1 ½ months based on the participatory process inclusive of all stakeholders and communities in the affected areas. Our sincere thanks to all those who contributed to this report and the UN, WB and EU for their overall guidance.

The PDNA report covers nine sectors and three cross cutting themes and looks at the overall impact of the disaster. As a complement to the PDNA, a Post Disaster Recovery Plan will be developed by the Government of Sri Lanka considering the available resources and budgets for next three years.

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. 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 of May 2017 was developed as a collaborative effort of the Government of Sri Lanka with its partners- the United Nations agencies, the World Bank, the European Union, and other organizations. 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 its partners. The Secretaries of the Ministry of Disaster Management, and the Ministry of National Policies and Economic Affairs would like to extend the 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 Mahaweli Development and Environment, Ministry of Rural Economic Affairs, Ministry of Sustainable Development and Wildlife, Ministry of Transport and Civil Aviation, Ministry of Women and Children Affairs, Ministry of Hill Country New Villages, Infrastructure and Community Development, 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, National Building Research Organisation, National Disaster Relief Services Centre, Natural Resources Management Centre, National Water Supply and Drainage Board, Sri Lanka Army, and Ceylon Chamber of Commerce.

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

Asian Disaster Preparedness Centre, European Union, Food and Agriculture Organization, International Labour Organization, Janathakshan (GTE) Ltd., 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 and World Health Organization.

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: Dr. S. Amalanadan (Addl. Secretary -Development - Ministry of Disaster Management), Mrs. Sepali Rupasinghe (Ministry of Disaster Management), Mr. M.D.N. Cooray (Ministry of Disaster Management), Anoja Seneviratne (Disaster Management Centre), Chaminda Pathiraja (National Disaster Relief Services Centre), Savithri Jayakody (NDRSC), Mr. S.S. Mudalige (Director General, Department of National Planning, Ministry

of National Policies and Economic Affairs), Ms. J.M.S.D. Rathnayake (MNPEA/NPD), M.F.A Mubarak (MNPEA/NPD), Mr. Sachith Fernando (MNPEA/NPD), Dr. Janaka Wickramarathne (Ministry of Health), Anuradhi Perera (Ministry of Power and Renewal Energy), Visaka Punyawana Hidellage (UNDP), Buddika Hapuarachchi (UNDP), Sureka Perera (UNDP), Ranjana Piyadasa (University of Colombo), Vajira Hettige (Coordinator PDNA), Luis Gamarra (Editor and Technical Advisor), Madhavi Ariyabandu (DRR and gender technical advisor), Rita Missal (UNDP), Kalana Cooray (UNDP), U.W.L Chandradasa, (UNDP), Aziza Uzof (UN-Habitat), Paula Bulancea, Mohamed Shibly Haroon Raseed, Watsala Jayamanna and Mihlar Mohammad Abdul Malik (UNICEF), Suranga Kahandawa (World Bank), Keiko Sakoda (World Bank), David Newhouse (World Bank), D.S.D. Jayasiriwardene (Consultant–World Bank), Janaka Weerawardana (Consultant–World Bank), Upali Delpechitre (Consultant–World Bank), Ana Maria Leal (UNFPA), Thisantha Ameresekere, Dinoo Prabhathi Wickramage and Buddhika Kodithuwakku (UNOPS), Ganga Samarawickrama and Buddhi Weerasinghe (ADPC), Laksiri Nanayakkara (WFP), Gemunu Wijesena (ILO), Shelly Khajuria (Language editor), Ranjith Weerasekara (Department of Census and Statistics), Lakmini Jayathilaka (OXFAM), W. P. Buddhima Madavi Gunarathna, W.B. Gayathri Kaushalya, Gihani Dikwaththa, Menaka Wasala Rajapaksha and Devin Sibera (UOC research assistants); Harinda Prasad Dayarathna, U.D.P.N. Gunasinghe, Hashanthi Cooray, Hirushan Rashintha, Harini Nawarathna, Amali Florita Gunasekara, Madushani Nawarathna and Milinda De Silva (MDM/UNDP), Hemantha Vithanage (Director, Center for Environmental Justice), Chathura Welivitiya (Managing Director, HELPO Eco Green Ltd), Mr. Firzan Hashim (Country Director, A-PAD Sri Lanka), Nalaka Gunawardhana (Senior Journalist) and Ms. Vindya Tissera (Media Consultant).

To the University of Colombo: Senior Professor Lakshman Dissanayake (Vice Chancellor- University of Colombo), Senior Professor J.K.D.S. Jayanetti (Dean - Faculty of Technology, University of Colombo) and Senior Lecturer Ranjana U.K. Piyadasa (Department of Geography). As well as the research asssistants team: W.A. Isurika Uthpalani Chularathna, Yuraji Chameekari Mahindadasa, K.K. Kalpana Sachini Kottawa, H.H. Dilini Tharaka, T.A. Samitha Nadeeshani, Tharindu Lakshitha Fonseka, B.G. Janaka Dilan Ekanayaka, Tharaka Nilmani Ariyawansha, B. Isuru Nilesh Senarathna , W.P. Buddhima Madavi Gunarathna, W.B. Gayathri Kaushalya, Maheshika Adikarinayaka, A.G. Dhanuja Shamantha Sirisena, Y.M. Kasundika Kumari Bandara, A.M. Pramuditha Mayuramali Karunarathna, Gihani Dikwaththa, Pubuduni Chandima, P.H.D. Janitha Sahan, Pranith Piyumal Ruwanpathirana, W.W.D. Dakshina, Chaminie Sudeshika Wanasinghe, Menaka Wasala Rajapaksha, Devin Sibera, and M.G.S. Pasan Aravinda.

To the representatives of the partner organizations: 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), Tung-Lai Margue (Head of the EU Delegation, Sri Lanka and the Maldives), Jorn Sorensen (UNDP Country Director, Sri Lanka) and Lovita Ramguttee (UNDP Deputy Country Director, Sri Lanka).

To the experts who peer reviewed the report: Rita Missal (UNDP), Krishna Vatsa (UNDP), Jeannette Fernandez (UNDP) and Lisa Bender (UNICEF).

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

List of Abbreviations

ADB	Asian Development Bank
BBB	Building Back Better
BCP	Business Continuity Plan
CBO	Community Based Organizations
CBSL	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
DCS	Department of Census and Statistics
DFID	Department for International Development
DMC	Disaster Management Centre
DE	Development and Environment
MNPEA	Ministry of National Policies & Economic Affairs
DNCWS	Department of National Community Water Supply
DOE	Department on Education
DPRD	Disaster Preparedness and Response Division
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DS	Divisional Secretary
DWC	Department of Wildlife Conservation
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
INDC	Intended Nationally Determined Commitments
INFORM	Index for Risk Management
IOM	International Organization for Migration
JICA	Japan International Cooperation Agency
KUC	Kolonnawa Urban Council
LECO	Lanka Electricity Company
LKR	Sri Lankan Rupee
MASL	Mahaweli Authority of Sri Lanka
MC	Colombo Municipal Council
MCCB	Moulded Case Circuit Breakers
MDM	Ministry of Disaster Management
MIWWRM	Ministry of Irrigation and Water Resources Management
MMDE	Ministry of Mahaweli
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 Organization
NCCAS	National Climate Change Adaptation Strategy
NCCP	National Climate Change Policy
NDMCC	National Disaster Management Coordination Committee
NDRSC	National Disaster Relief Service Centre
NFI	Non–food item
NGO	Non–governmental organization
NIID	National Institute for Infectious Diseases
NITF	National Insurance Trust Fund
NNDIP	National Natural Disaster Insurance Policy
NWS&DB	National Water Supply and Drainage Board
NWSDB	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
PRDD	Provincial Road Development Departments
PS	Pradeshiya Sabah
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
SLR	Sri Lanka Railways
SLRCS	Sri Lanka Red Cross Society
SLTB	Sri Lanka Transport Board
SME	Small and Medium–sized Enterprises
UDA	Urban Development Authority
UN	United Nations
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 Organization
WMA	Waste Management Authority (Western Province) **WSP** Water Safety Plan
ZOA	Zuid Oost Azie

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PDNA ASSESSMENT REPORT

EXECUTIVE SUMMARY

1. Disaster event:

The southwest monsoon brought heavy rains and strong winds to Sri Lanka. In two days (25-26 May) the precipitation raised up to 600mm, provoking flash floods and landslides in 15 of the 25 districts of Sri Lanka. Population in the Sabaragamuwa, Southern and Western Provinces; particularly Rathnapura, Matara, Hambantota, Kalutara and Galle districts experienced the highest impact. The high vulnerability of rural and urban areas led to 219 deaths, approximately 230 thousand families got affected, and 88 thousand houses were partially or fully damaged. At the peak of the event, more than 28,000 families were assisted in safety centres and over 1,100 people still remain displaced (NDRSCC, 18-July).

Floods

The May 2017 Floods affected towns, villages and agricultural areas located in the borders of the Kalu, Nilwala and Gin rivers and their tributaries. In some areas, the water levels reached 6m high and remained for 4-10 days period affecting urban and rural dwellings, small and medium enterprises, micro (mostly informal) businesses, education and health services and public and private infrastructure.

Landslides

Moreover, in May 2017, 35 major landslides occurred causing the major number of deaths from the disaster events, 176 out of 219. The Table 2 shows the major landslides registered. Mostly the heavy rains combined with the slope instability caused by inappropriate land use and roads cuts triggered the movement of major masses of soil and rocks over houses, public infrastructure and economic activities.

TABLE 1: AFFECTED PEOPLE AND HOUSES
SOURCE: NDRSC

	Description	Galle	Rathnapura	Kalutara	Matara	Hamban-tota	Other districts	Total
Disaster affected details	No of Families	40,814	60,080	51,505	49,541	2,432	24,863	**229,235**
	No of Members	158,693	235,197	192,464	183,008	10,457	99,959	**879,778**
	No of Deaths – Male	7	37	21	17	3	4	**89**
	Female	9	35	25	8	2	5	**84**
	Children	0	14	24	7	0	1	**46**
	Total Deaths	**16**	**86**	**70**	**32**	**5**	**9**	**219**
	Injured people	4	99	20	16	-	15	**154**
	Missing people	-	15	43	15	-	1	**74**
Damages houses	Fully damage	445	803	602	1,015	143	40	**3,048**
	Partially damage	18,888	12,345	14,390	27,686	992	2,502	**76,803**
Relief Camps*	No. of Centers	11	221	94	21	4	153	**504**
	No. of Families	434	11,685	3,399	3,054	55	9,293	**28,100**
	No. of Members	1,063	47,064	13,689	11,766	198	36,110	**109,890**

1. Information registered during the peak of the disaster (June 2017).

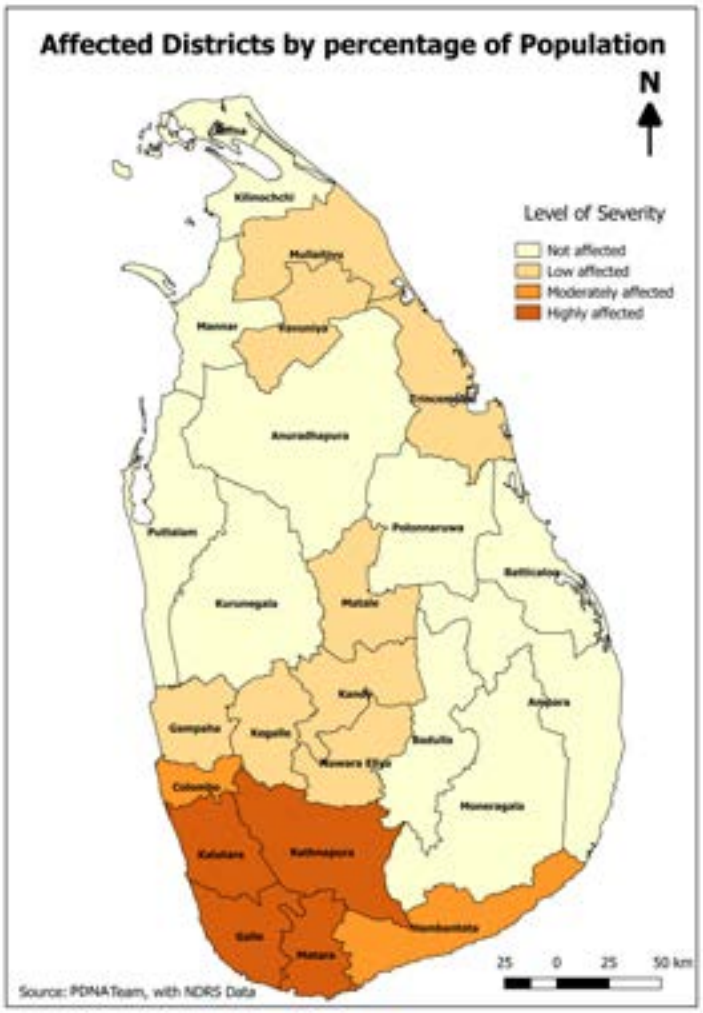

FIGURE 1: MAP OF AFFECTED DISTRICTS

2. Relief operations and national and international assistance

In the aftermath of the event, immediate search and rescue operations were put in place with the support of the three military forces. During the peak of the disaster, the District Secretaries established 504 safety centres, which housed 109,890 people evacuated from the flooded areas and unsafe locations in the landslides prone sites.

As of 31 July 2017, the Government of Sri Lanka (GoSL) has released LKR 995,693,382.89 for emergency relief, cleaning of interrupted roads and main infrastructures, and logistics.

In addition to these immediate expenses, the GoSL released two funds additionally to directly support the affected families:

- Housing compensation (LKR 10,000 / US$ 67 per affected house) for cleaning, minor repairs or equipment purchase. As of July 2017, a total amount of LKR 755,441,900 (US$ 5,036,279) was delivered to 75,677 families, through the District Secretaries.

- Rental allowance (LKR 7,500 / US$ 50 per partially or totally damaged house), to be extended for a period of three months. As of July 2017, a total amount of LKR 75,852,500 (US$ 505,683) was distributed to 3,549 families.

TABLE 2: LOCATION AND AFFECTED PEOPLE BY LANDSLIDES
SOURCE: NBRO

District	DS Division	GN Division	Deaths	Houses	Other infrastructure	Pre-event land use
Rathnapura	Eheliyagoda	Maheengoda	12	8	Road and electricity	Rubber plantations
	Nivithigala	Wanniwatha	26	15	Road and electricity	Tea, rubber, arecanut and coconuts
	Kalawana	Wewelkandura	13	4	Road and electricity	Tea, cinnamon, arecanut and jackfruit; and residential areast
Matara	Kotapola	Morawaka	23	33	Electricity	Forest, paddy and tea, and residential areas
Kalutara	Bulathsinhala	Karaldekka	19	5	Road and tap borne water	Rubber and tea plantations
		Niggaha	21	9	Road, tap borne water and electricity	Tea plantations, rubber and residential areas

Private sector and individual donations:
The operations of the GoSL were supported with relief items collected and distributed by private companies, the general public and the media. The Ministry of Disaster Management (MDM) opened a bank account to receive relief donations from private companies and individuals. As at 24 July 2017, the amount received from contributions is LKR 27.5 million.

Similar to flood situation in 2016, the Dialog mobile company held a national campaign for customer donations, receiving LKR 16.53 million. The company tripled this amount contributing with LKR 33.47 million, generating a total amount of LKR 50million (US$ 330,000 approx.). The funds collected will be used in house building. Other private companies and volunteer organizations provided relief assistance in numerous ways.[2]

International organizations:
UN agencies, and national and international NGOs are supporting the national efforts for disaster relief and early recovery. A total amount of LKR 1,270 million (US$ 8.1 million) was mobilized to ensure child protection, education, food security and nutrition, water provision and sanitation, health, shelter, NFI provision and emergency livelihood support. A breakdown can be found in Annex 7-International Response and Foreign Donations.

2. Some of them can be seen in: http://www.readme.lk/flood-relief-tech-2017/

TABLE 3: EMERGENCY RELEASED FUNDS
SOURCE: MDM/DMC

	LKR (Millions)	US$ (Millions)
Relief distribution	983.00	6.6
Logistic expenditure for response	11.00	0.07
Initial rehabilitation	1.70	0.01
TOTAL	**995.70**	**6.64**

Many bi-lateral and multi-lateral donor agencies and countries responded to the request by the Government of Sri Lanka through the Ministry of Foreign Affairs to support with emergency response and relief activities. Some countries sent shipments of relief materials while others (Thailand, Bangladesh and Ireland) provided direct financial support to the GoSL amounting to LKR 166 million (USD 1.1 million), through the MDM bank account.

3. Country profile including disaster profile[3]

Sri Lanka is facing new opportunities for social and economic development. The country is in the path towards becoming a middle-income country and to progressively achieve the Sustainable Development Goals (SDGs). Nevertheless, there still remain disparities between regions and social groups. Moreover, the economy is fragile and ¼ of the population is considered nearly poor and vulnerable to shocks that can push them back into poverty. Climate related disasters might be one of these drivers, with a recurrent occurrence of droughts, floods and landslides, affecting particularly the impoverished sectors living in high risk conditions with reduced capacities for recovery.

3. Sources: Human Development Report [HDR] 2016 UNESCAP 2017

SRI LANKA
Area: 65,510 sq Km
Population: 20.7 million (2016)
HDI: 0.750 (78 out of 188 countries)
Gender inequality index: 0.39
Poverty rate: 6.7
Per capita income: US$ 3,279
Expected economic growth: 5.5 % (2017)
Lower middle-income country

Social and economic situation of the five most affected districts

The five most affected districts by the May 2017 floods and landslides experienced the benefits and consequences of this development trend. The rural population has increased to more than 4 million people, with the correspondent expansion of agricultural land, particularly oriented to tea and rubber production in slope areas. Moreover, cities, towns and villages have expanded by the rivers and streams bordering the main cities. The informal housing and economic activities have developed and consolidated regardless Local Governments regulations, surpassing their capacities to conduct, monitor and control them.

Flood and landslide risks in Sri Lanka

The effects of floods and landslides in 2017 confirmed the increasing impact of climate related disasters in Sri Lanka coupled with haphazard human development activities. This requires to be considered as a priority in national policy. During the period 2005-2015, floods affected

TABLE 4: BASELINE DATA IN THE AFFECTED AREA
***SOURCE:* CENSUS 2012**

District	Population	Pop growth Rate	Urban	Rural	Estate sector	Poverty Rate	
						Index	Absolute Reduction (2002-2012)
Galle	1,063,334	0.67%	12.5	85.7	1.8	9.9	16.1
Hambanthota	599,903	1.23%	5.3	94.7	-	4.9	27.1
Kalutara	1,221,948	1.28%	8.9	88	3.1	3.1	16.9
Matara	814,048	0.63%	11.9	85.4	2.7	7.1	19.9
Ratnapura	1,088,007	0.64%	9.1	81.7	9.2	10.4	23.6

64% of the Sri Lanka's total population. High impact disaster events are occurring frequently since 2011 which on average affect more than 1 million people annually. In 2016, almost 500 thousand people were affected by floods and landslides causing 93 deaths and 117 people still reported as 'missing'.

Nowadays, particular emphasis should be placed to landslides risk prone areas, due to the resulting high number of deaths. In 2016, 50 out of 93 deaths, and, in 2017, 176 out of 219 deaths (81%) were from the landslides. Both floods and landslides are closely related to land use practices and the pressure of human activities over sensitive areas. The stability of river banks and steep slopes are affected by ad – hoc development practices including construction of houses and other infrastructure, roads and water systems and deforestation for agriculture aggravating potential for landslides.

Financial instruments for recovery

The GoSL counts with two potential instruments to fund recovery: The National Insurance Scheme (NIS) and the Catastrophe Deferred Drawdown Option (CAT-DDO). These instruments may provide a budget of US$ 168.6 million.

The NIS covers lives and properties, specifically all households and small business establishments. Any business for which annual turnover does not exceed 10 million rupees (approx. US$ 66 thousand) is covered up to 2.5 million rupees each in respect of damages per event. Under this scheme, compensation for death is LKR 100,000 and for property damage (house and SME) is maximum LKR 2.5 million.[4] An advance of this insurance was distributed to the affected families as a LKR 10,000 compensation provision. In addition, the CAT-DDO provide access to up to US$ 102 million loans from the World Bank to provide immediate liquidity if a disaster occurs.[5] This facility was activated in the aftermath of the 2016 floods and landslides, releasing the total mentioned amount.

Although the 86 DS Divisions affected by the floods are not considered poor in average, impacts were larger in the poorest sectors of population (Table 4A). An estimated 8.7 percent of those affected were poor, which was slightly higher than the prevailing national rate of 6.6 percent. The people affected by landslides are substantially poorer, with an average poverty rate of 11.6 percent. In comparison to other disasters, the impact of 2017 floods and landslides

4. The total insurance coverage is up to LKR10 billion per year (US$ 66.6 million), of which LKR8.5 billion are earmarked for damages caused to property and contents of households and small business. The balance of LKR1.5 billion covers immediate emergency relief to the affected people.
5. The full amount was withdrawn in 2016.

TABLE 4A: ESTIMATED POVERTY RATES IN AFFECTED AREAS

Disaster	Number of DS Divisions affected	Measure of effect	Estimated poverty rate of affected persons
2017 Floods	86	Affected persons	8.7%
	11	Affected by landslide	11.6%
2016 Floods	256	Affected persons	6.1%
	256	Persons in safety	7.9%
2017 Drought	163	Affected persons	11.7%

Source: Calculations based on disaster reports from Disaster Management Centre and 2011 DS Divisional poverty estimates produced by World Bank and Department of Census and Statistics.

Notes: the estimated poverty rate of affected persons is the weighted average of the ds divisional poverty estimates from 2012, with the weight equal to the share of persons affected by the disaster in each ds division. the estimated poverty rates of the affected ds division is the weighted average of the ds division estimates, with the weights equal to the share of the population residing in each ds division.

was more concentrated in areas inhabited by poor communities as compared to 2016. However, this rate is higher in areas being affected by the current 2017 drought (11.7%).

4. Disaster effect and impact

According to information from the five most affected districts, cost of the effects of the May 2017 floods and landslides (damages and losses) sum up to LKR 70 billion. The most affected sectors in terms of costs are Housing, Agriculture, Transport and Industry & Commerce. In addition, disaster events affected the provision of services such as health (65 centres affected), education (382 centres out of 2122 in the affected districts) and water and sanitation. Further, effects related to crosscutting issues such as disaster risk reduction, gender, environment, employment and food security needs to be considered in identifying sustainable recovery strategies.

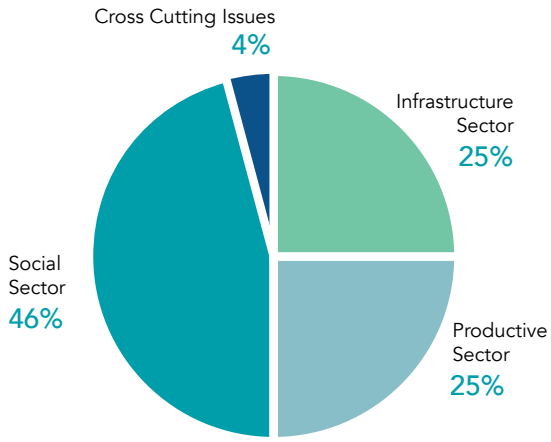

FIGURE 2: TOTAL EFFECTS BY MAIN SECTOR
SOURCE: PDNA TEAM

TABLE 5: FLOODS AND LANDSLIDES 2017, TOTAL DAMAGES AND LOSSES

Sectors	Damages LKR (Million)	Losses LKR (Million)	Total Effects LKR (Million)	Total Effects US$ (Million)
Social Sector	**30,408.31**	**2,406.96**	**32,815.27**	**218.77**
Housing	29,047.01	1,992.53	31,039.54	206.93
Education	1,205.20	212.60	1,417.80	9.45
Health	156.10	201.83	357.93	2.38
Productive sector	**12,945.42**	**4,725.19**	**17,670.61**	**117.8**
Agriculture	10,292.95	2,401.1	12,694.05	84.63
Industry & commerce	2,652.47	2,324.09	4,976.56	33.17
Infrastructure sector	**16,386.71**	**584.84**	**16,971.55**	**113.13**
Irrigation	1,535.9	31.6	1,567.5	10.45
Water & sanitation	1,531.90	143.49	1,675.39	11.17
Transport	12,844.60	231.60	13,076.20	87.17
Power	474.31	178.15	652.46	4.34
Cross cutting issues		**2,814.58**	**2,814.58**	**18.76**
Disaster risk reduction		2,262.46	2,262.46	15.08
Environment		552.12	552.12	3.68
Total effect lkr	**59,740.44**	**10,531.57**	**70,272.01**	**468.48**

US$ 1 = LKR 150

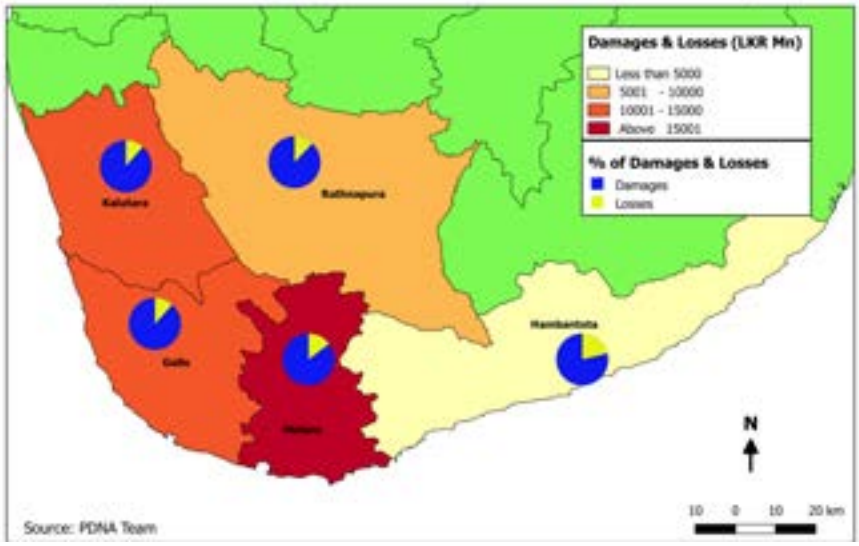

FIGURE 3: MAP OF DISTRIBUTION OF EFFECTS DISTRICT WISE (AVAILABLE DATA)
SOURCE: PDNA TEAM

In terms of absolute costs of effects, Matara is registered as the most affected district, followed by Galle and Kalutara. These three districts concentrate a major urban population, infrastructure, industry and commercial activities over spread lowland areas. In addition, Ratnapura has been highly affected by landslides, adding up 18 of the 35 cases. The estimation of effects gathers (1) the costs of damages to the infrastructure, stocks and assets, and (2) the losses related to additional costs oriented to ensure the provision of goods and services as well as the foregone incomes in public and private sectors. As a consequence, losses are higher in the Housing, Agriculture, Industry & Commerce and Disaster Risk Reduction sectors.

Comparison of effects to the private vs public sectors

The floods and landslides affected both public (32% of the total damages and losses) and private sectors (68%). With reference to the private, the most affected sectors correspond to Housing, Agriculture and Industry & Commerce. Consideration for sustainable strategies is required for recovery and restoration of damaged goods and livelihoods.

The most affected sectors in the public sphere correspond to Transport, Irrigation, Education and Water & Sanitation. In addition, there are expenses for providing relief assistance, for rehabilitating key infrastructure by the tri-forces, and for the logistics.

5. Crosscutting issues

The May 2017 floods and landslides amply demonstrated the urgency for mainstreaming of disaster risk reduction into development planning and implementation. The critical need for immediate and long term measures to prevent the expansion of urban and rural

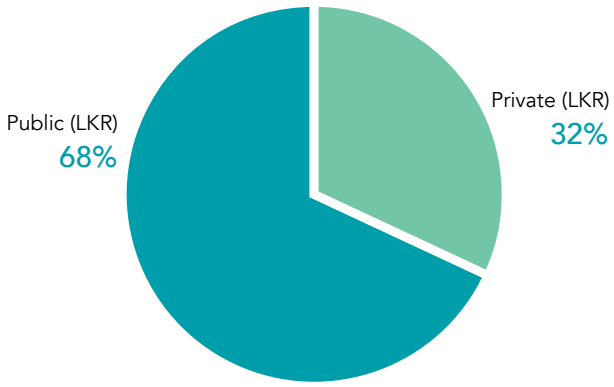

FIGURE 4: COMPARISON PUBLIC – PRIVATE EFFECTS
SOURCE: PDNA TEAM

settlements and economic activities over hazard-prone areas which exacerbate the existing vulnerable conditions is evident from all affected locations. Capacities of government Ministries and Departments at local, district and central levels should be strengthened in order to adequately carry out this mandate. Strengthening community capacities and resilience with awareness, knowledge, timely and functioning early warnings to the last mile is a key requirement for priority attention. It should be noted that although information about the onset of the Southwest monsoon over Sri Lanka was widely publicized by the media, there were significant lapses in evacuating people to safety. In the aftermath of the disaster, while the whole country demonstrated their solidarity and support for the affected families, gaps in actions and coordination by the mandated institutions were clearly evident. Clarity and definition of roles and responsibilities first and foremost of the public institutions as well as the media and private sector is required for early and sustainable recovery.

Maintaining environment sustainability is a crucial consideration for reducing the risks and impacts of climate induced adverse weather events. Disaster impacts of hydro-meteorological hazards are compounded by the pressure of human activities over sensitive land areas, as evidenced in the large number of landslides in areas covered by rubber, tea and other crops, or steep slopes cut by roads, water or electricity systems. Flash floods affected urban, rural human settlements as well as agricultural land in flood plains and in low-lying areas. Inappropriate solid waste management also has hindered the water flow and aggravated the inundation in these areas.

Effects of disasters are different on varying population groups in society i.e. women, men, children, youth or elders, due to their pre-existing social, economic and institutional standing. Damages and losses needs to be assessed and understood accordingly in order to prepare appropriately tailored recovery strategies. Special attention should be drawn to the psycho-

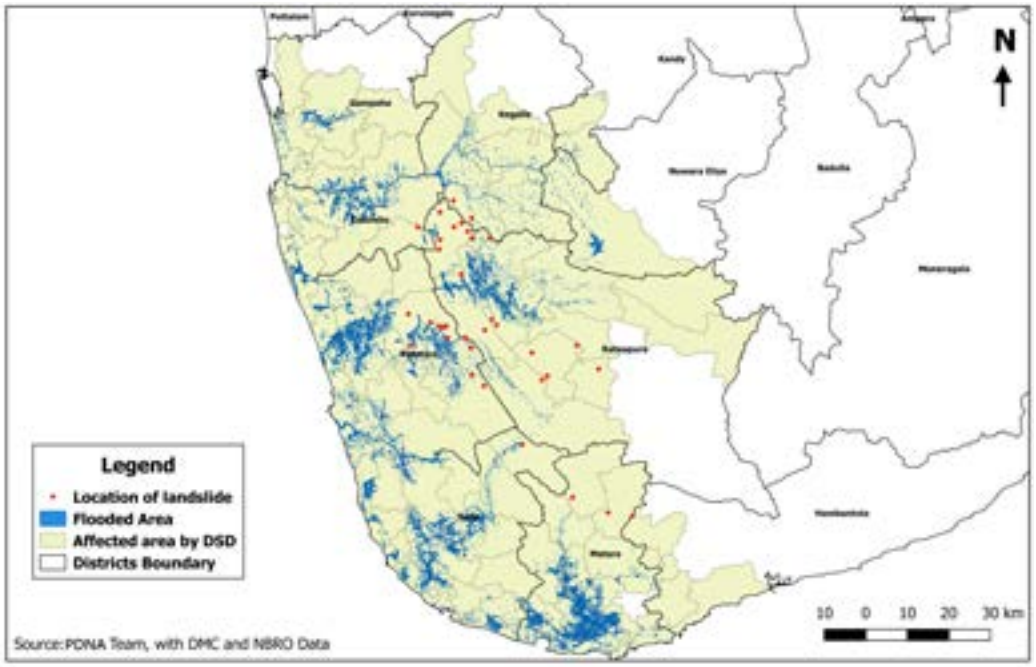

FIGURE 5: AFFECTED DS DIVISIONS BY FLOODS AND LANDSLIDES 2017
SOURCE: PDNA TEAM

logical recovery of the disaster-affected people simultaneously with the provision of physical recovery assistance. For example, ensuring early access to education would enable children to recover faster from the traumatic experience. Many of the displacement safety centres did not consider need based requirements, i.e. separate and closed toilets, adequate lighting, tents secure with locks, community and psycho-social counselling services, etc. For recovery, it is important to take into account that more than 300 thousand households are women headed in the affected areas, with implications in the access to property, loans and assistance for housing and livelihoods recovery.

The disaster-affected districts are economically highly active in agriculture, trade and services sectors. The formal and, particularly, the informal sectors have developed in micro, small and medium size enterprises. Most of these establishments do not have access to credit loans and will depend on the National Insurance Scheme for recovery. The employment sector was widely affected particularly for day labourers in agriculture, trade and services, since in addition to the direct damages the affected areas were cut off for over two weeks since 25 May 2017 until the access has been progressively opened in June and July 2017. Strategies to reactivate SME enterprises and informal sector activities is required with consideration to providing opportunities for wage labour employment, cash for work, among others.

6. Recovery needs

The total recovery needs are estimated at LKR 118 billion. The sectors that require major amounts of financial resources are Housing, Transport, Water & Sanitation and Agriculture. At the same time, to achieve a sustainable recovery, an integrated implementation strategy inclusive of Social, Productive, Infrastructure and Crosscutting sectors is a must.

The GoSL will lead the recovery and reconstruction efforts. Options to fund the recovery are insurance for housing reconstruction and asset replacement, budgetary reallocation, usage of the CAT-DDO for large infrastructure projects, loans or grants from multilateral and bilateral agencies, or contributions and investments from the private sector.

A variety of principles will guide the recovery strategy, aiming at improving the quality of recovery, ensuring equity and inclusion, and promoting risk reduction and long-term resilience. The recovery strategy is based on the resilience- and sustainability-oriented "Building

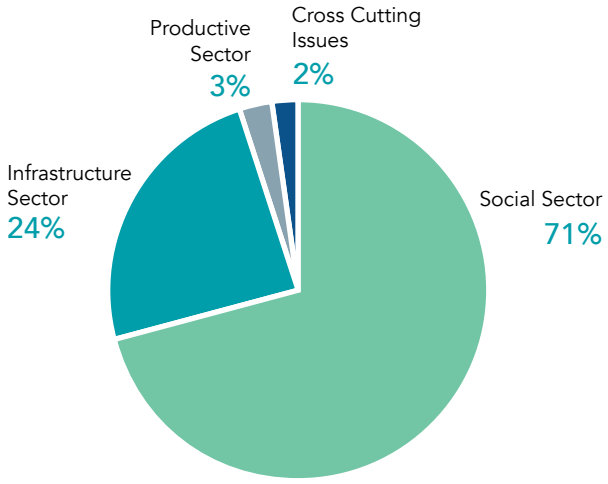

FIGURE 6: RECOVERY NEEDS BY MAIN SECTORS
SOURCE: **PDNA TEAM**

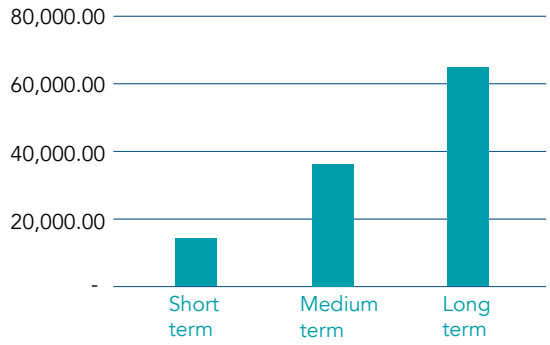

FIGURE 7: RECOVERY NEEDS TIMELINE
SOURCE: **PDNA TEAM**

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 2017, while the medium-term needs are projected for the year 2018 and the long-term needs for the three years from 2019 to 2020. Early recovery needs are proposed to be addressed in the short term (12% of the total recovery needs) oriented to immediately restore the social, institutional and economic activities. Additional resources should be allocated in the medium (32%) term to consolidate the recovery process, addressing the housing, services, livelihoods and infrastructure reconstruction. In the long term (58%) strategies are oriented to ensure a sustainable recovery process, promoting changes in the social and economic investments under upgraded environmental, inclusive and disaster risk reduction standards. Capacity strengthening at community and institutional level has been taken into account in all sectors to reduce and prevent risks, as well as to respond and recover in a more effective way.

An overview of the recovery needs by sector is given in the table 6.In correspondence with the estimation of effects, the recovery needs are geographically concentrated in the districts of Matara (particularly in housing, transport and irrigation), Galle (housing, health and transport) and Kalutara (housing and transport). Considering the damages and losses related to landslides, Rathnapura requires major resources in the medium term, oriented to housing relocation, and consecutive reconstruction of infrastructure, i.e. health, transport and water and sanitation.

TABLE 6: RECOVERY NEEDS FOR ALL SECTORS

Sectors	Short term	Medium term	Long term	Total recovery needs (MILLION LKR)	Total recovery needs (MILLION US$)
Social Sectors					
Housing	1,987.62	24,290.71	55,014.76	81.293.09	541.95
Education	125.45	1,306.00	84.20	1,515.65	10.10
Health	80.00	624.30	257.55	961.85	6.41
Productive Sectors					
Agriculture	939	1,610	1,721	4,269.89	28.47
Industry & commerce	5	19.00	17.00	41.00	0.27
Infrastructure Sectors					
Irrigation	153	2,288	-	2,441	16.27
Water and sanitation	73.7	1,627	6,699.43	8,400.13	56.00
Transport	10,604.30	4,351.80	–	14,956.10	99.71
Power supply		554.00	1,566.00	2,120.00	14.13
Crosscutting issues					
Gender	33.43	61.5	5.00	99.93	0.67
DRR	163.50	443.00	778.00	1,384.50	9.23
Environment	303	530		833	5.55
Total LKR	14,468.00	37,705.2	66,142.94	118,316.14	788.77
Total US$	96.45	251.37	440.95	788.77	1 US$ = LKR 150

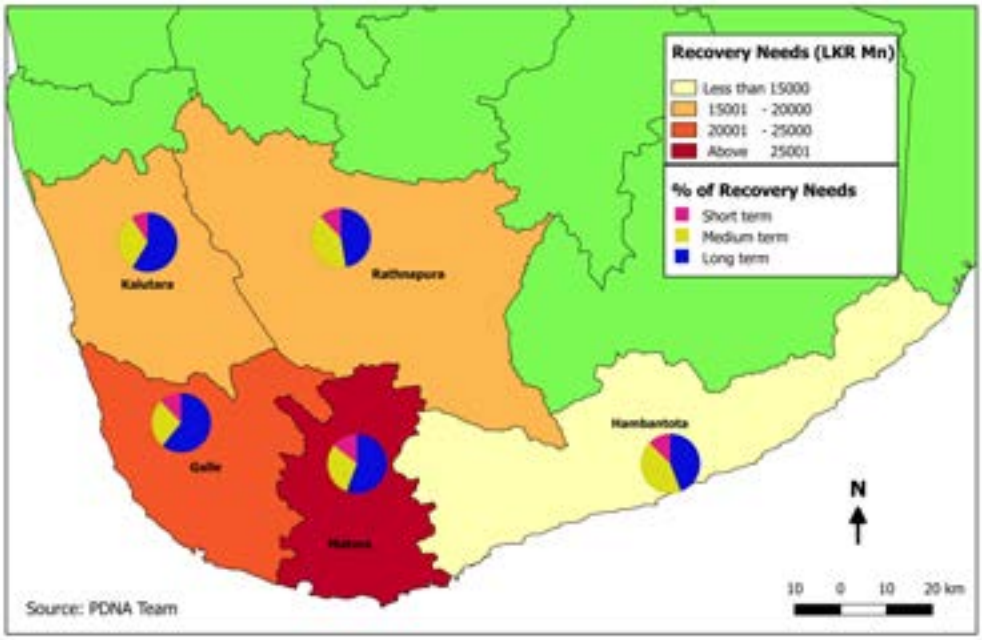

FIGURE 8: MAP OF DISTRICT WISE (AVAILABLE) RECOVERY NEEDS IN TIME RANGES
SOURCE; PDNA TEAM

7. Conclusions and recommendations

The present assessment was developed between July and September 2017, involving public sector ministries and entities, UN agencies and NGOs, and the University of Colombo. The participation of the UOC has been crucial as permitted an intensive data collection and processing, which facilitated the analysis by the leading sectors and supporting agencies.

From this assessment, some conclusions and key recommendations oriented to enhance the current recovery process and promote a more sustainable and resilient development process, are as follows:

- **Coordinated information collection and management:** Information collection and management requires to be enhanced to reduce risks, to better prepare the population and to recover in a prompt and efficient way. The impact of this disaster would have been lower if territorial and climate related data would have been collected, disseminated and appropriately used in planning and decision making. Systematic, regular and disaggregated collection of hazards, risks and vulnerability information and their use for recovery and sectoral development planning is of critical importance.

In the aftermath of the disaster, clear and concrete disaggregated (in term of gender, age, disabilities and socio-economic conditions) data is crucial to assist the most affected population according to their capacities and needs and to promote an immediate recovery. This information should be available at different levels representing issues of a range of stakeholders such as; administrative levels, sector ministries and issues, public and private stakeholders. This will permit designing sustainable recovery programmes and subsequent monitoring of the progress and impact.

It is important to note that Post-Disaster Data collection by different agencies will puts pressure specifically for local level of-

ficers during first few weeks of the disaster. Therefore, it is necessary to have pre-disaster baseline information which helps to identify approximate status of affected population. To this end, an inter-agency coordinated data collection process and pre-defined formats by national and local level institutions is noted as a requirement.

- **Intersectoral coordination in interventions:** Recovery is a complex process that requires involvement of all actors and sectors in development. At this stage, each sector has come out with a set of specific recommendation to promote their own recovery process. Nevertheless, the impact of these strategies will be much more effective if the implementation is coordinated among all stakeholders involved, using the resources and expertise of the GoSL, the civil society, the development partners and the private sector. This will avoid duplication and help address the gaps in unattended issues, areas or population.

- **Balance in all development areas:** The disaster has affected all aspects of development; the infrastructure sectors (water and sanitation, power supply, transport and irrigation), the social sectors (housing, education and health) and the productive sectors (agriculture, fisheries, livestock, and industry and commerce). Therefore, there should be an adequate balance when programming and budgeting, and subsequently when monitoring progress. The prioritization of only a few sectors – i.e. only the infrastructure sectors may endanger an integrated, sustainable and more resilient recovery.

- **Focus on capacity strengthening for DRR, particularly the local level:** 2016 and 2017 disaster events demonstrated some critical weaknesses to prevent the accumulation of risks. In order to promote a "building back better" process and to reduce the generation of new risks and vulnerabilities, the capacities of all stakeholder should be strengthened with appropriate regulations, technology, human resources and budget. In all sectoral strategies strengthening knowledge and capacities for disaster risk reduction must be considered as priority.

- **Rethinking of development patterns under new environmental standards:** The May 2017 floods and landslides has added to the May 2016 situation of floods and landslides. There are also the consequences of an on-going drought in several districts. In general terms, the risks to climate-related events in the country are increasing. This situation urgently demands the re-visiting and revision of the development processes, the public and private investments plans and programmes, and the current patterns of urban and rural expansion. Land use planning and their effective implementation is crucial for preventing existing risks and the occurrence of new risks and disasters.

- **Focus on the most vulnerable communities.** Poor people are more vulnerable to disasters since they live in risk prone areas, having little assets and fragile livelihoods with no/limited social security schemes. Sometimes, damage to their livelihood is not captured in data collection (i.e. agriculture and daily labourers, self-employed informal workers) and they have no access to insurance systems. Therefore, special attention should be paid for most vulnerable people and relief and recovery programmes shall focus to strengthen them in order to avoid the reconfiguration of risk conditions. Attention in this regard is drawn to female headed households and to the productive role women play in disaster recovery.

- **Strengthening preparedness, response and recovery capacities:** Recovery process need to be oriented to reduce the risk conditions in the areas affected by disasters, encouraging changes in development patterns

in the medium and long term. Thus, immediate preparedness capacities should be enhanced in order to enhance capacity to respond more efficiently. The existing early warning system require to be enhanced from the national to local level, and the communities should be prepared to receive, understand and react accordingly. Revitalising of District and Divisional Disaster Management Committees (DDMC) with the participation of the all sectoral ministry representation at the district and divisional level are strongly recommended in this regard. Village disaster management committees should be re-vitalised with a view to increase the engagement of the communities in disaster preparedness and response.

Equally important is to look into limitations experienced in safe shelters responding to the emergency requirements of diverse groups -infants, children, women, adolescents and elderly, in preparing for future emergency scenarios. Planning for safe shelters equipped with basic facilities and requirements well in advance is recommended.

Moreover, at the national level the roles and responsibilities of relevant institutions including MoDM, DMC, and NDRSC should be assessed, defined and enhanced. This will be contributory to more efficient and well-coordinated preparedness, relief distribution and camp management including psycho-social support. This is an important step towards supporting and facilitating DRR measures taken by the sectoral ministries and other main stakeholders.

- **Engagement of the business sector:** Taking into consideration the contribution of the business sector extended in the post disaster situation and the willingness expressed to play a more consistent role, it is suggested to consider business sector engagement in a well-coordinated manner, including during non-disaster times.

  Post-disaster recovery capacities should also be enhanced. This might include the information system mentioned above together with a pre-disaster recovery framework, which states the policies and strategies to be implemented in the aftermath of a disaster. The pre-defined roles and responsibilities will also help to identify the capacities that require to be enhanced at the national and local levels.

- **Monitoring recovery process and communication.** Finally, to ensure that the recovery process is being properly planned and implemented, a monitoring system should be put in place. The overall progress and gaps might be periodically reviewed, and the activities and results should be adequately communicated to the public. This will ensure transparency and accountability and minimise conflicts. ■

SECTOR REPORTS

1. Housing

1.1. EXECUTIVE SUMMARY

The Housing, Land, and Settlements sector assessment includes comprehensive study of the effect and the impact on the sector as a whole, supporting and formulating effective recovery and response-related mechanisms, as well as recommending measures to increase the resilience of the aforementioned sector in the face of recurrent hydro-meteorological disasters. (Table 7)

The total damage in the sector has been estimated to stand at LKR 29.05 billion, losses at LKR 1.99 billion, and total needs at LKR 81.29 billion. In target districts, 77,309 housing units were damaged by the disaster, including 3,008 fully-damaged units and 74,301 partially-damaged units. Over 80% of the damage was in rural agricultural areas. The recurrent disasters have had an adverse impact on the livelihoods of at-risk communities, caught in a vicious cycle of poverty. The geographical distribution of the number of houses damaged is provided in Table 8 below.

The losses incurred include loss of rental income of owners of damaged houses, cost of emergency shelter support in the form of maintenance of welfare centres, construction of transitional shelters, and the repair of emergency shelters and provision of tents, the provision of emergency cash grants, and finally, rental allowance allocated for fully-damaged and relocated houses.

Recovery and reconstruction strategies in the aftermath of the tragedy include:

1) Provision of sustainable emergency shelter assistance to affected households, includ-

TABLE 7: EFFECTS AND NEEDS ESTIMATES
SOURCE: NDRSC DATA COMPILED BY PDNA TEAM

		LKR Million	US$ million
Effects	Damages	29,047.01	193.65
	Losses	1,992.53	13.28
	Total Effects	31,039.54	206.93
Needs	Short Term	1,987.62	13.25
	Medium Term	24,290.71	161.94
	Long Term	55,014.76	366.77
	Total Needs	81,293.09	541.96

TABLE 8: GEOGRAPHICAL DISTRIBUTION OF HOUSING DAMAGE
SOURCE: NDRSC

District	# of houses damaged		
	Partial	Full	Total
Kalutara	14,390	602	**14,992**
Ratnapura	12,345	803	**13,148**
Galle	18,888	445	**19,333**
Matara	27,686	1,015	**28,701**
Hambantota	992	143	**1,135**
Total	**74,301**	**3,008**	**77,309**

ing rental and repair grants, as well as the construction of transitional shelters for the most vulnerable.

2) Establishing a comprehensive housing and data management system to ensure an updated inventory of housing and assets which can be effectively used in the development planning, assessment and verification of damage during disasters, and in the process of putting together assistance packages.

3) Medium-term housing reconstruction support in the form of in-situ housing reconstruction and repair in low flood-risk locations, with insurance compensation augmented with grants for vulnerable households, and concessionary loans administered through the Ministry of Housing and Construction at the rate of LKR 800,000 for fully damaged, and LKR 200,000 for partially-damaged houses. Construction is to be primarily implemented through the owner-driven approach.

4) Medium-term housing reconstruction grant of LKR 1,200,000 per house affected or at areas facing a high risk of landslides, and LKR 400,000 land-grant or alternative land for relocation as per the existing government policy. An amount of LKR 120,000 has also been set aside to account for land preparation and basic infrastructure cost. Construction modality can be owner-driven, community-driven or through the military, as is deemed appropriate. The purchase of a house and land up to a value of LKR 1,600,000 in a safe location has also been permitted.

5) Residual housing reconstruction needs, including the upgradation of damaged, improvised and semi-permanent housing to permanent housing by following the 'Build Back Better' principles. The reconstruction of permanent housing will follow an owner-driver reconstruction approach, inclusive of 'Build Back Better' standards. The reconstruction of the permanent housing will be of the size which existed prior to the disaster, and home-owners will be provided with the option of accessing sustainable housing financing options in the long term.

6) Revision of land-use plans, incorporating land zonation within the National Development Plan, based on multi-hazard maps, revision, and enforcement of construction planning and building regulations in the districts targeted by this PDNA.

7) Technical support to homeowners and builders engaged in reconstruction activities through NBRO, NHDA and Technical staff from Divisional Secretariats to ensure the adherence to minimum DRR standards developed by NBRO and 'Build Back Better' principles.

Early recovery activities will be implemented by District and Divisional Secretariats with the facilitation of the National Disaster Relief Services Centre, the UN and other humanitarian agencies. Reconstruction will be implemented by the National Housing Development Authority under the Ministry of Housing and Construction, and the Ministry of Hill Country New Villages, Infrastructure and Community Development in Plantations sector. The entire process requires active collaboration with the National Building Research Organization, and the National Disaster Relief Services, Centre of the Ministry of Disaster Management, and the respective Local Government Authorities, and District and Divisional Secretariats.

1.2. PRE-DISASTER CONTEXT AND BASELINE

The settlements in Sri Lanka are classified by the Department of Census and Statistics based on their social, economic, and administrative characteristics as urban, rural and estate. Similarly, the Department of Census and Statistics

has classified houses as permanent, semi-permanent and improvised, based on the construction materials used. The total housing stock in Sri Lanka is 20,359,439 units as per the 2012 Census of Population and Housing, of which 80 percent is classified as permanent, 19 percent as semi-permanent, and less than 1 percent as improvised. The total housing stock of Kalutara, Ratnapura, Galle, Matara and Hambantota districts is 1,228,036 units, of which 1,032,870 (84.75%) housing units are permanent, 182,357 (14.96%) are semi-permanent, 3,358 (0.28%) are improvised, and 173 (0.01%) are un-classified.[6] The national demand for new houses is approximately 50,000 units per annum, while the number of new houses constructed is approximately 30,000 per annum.[7] The total number of rented housing units in the target districts is 17,819. Kalutara District has the highest number of rented housing units (7,937), while Hambantota has the lowest (1,526).[8]

Governance: The Ministry of Housing and Construction is the key stakeholder at the national level for housing, while the Ministry of Local Government and Provincial Councils, and the Ministry of Mega-polis and Western Development are responsible for the administration of local governmental activities. The Ministry of Lands is responsible for the administration of land-related matters in all areas except in estates, where the land is under the purview of the Ministry of Plantation Industries. The welfare of estate communities is the responsibility of the Ministry of Hill Country New Villages, Infrastructure, and Community Development, together with the Regional Plantation Companies (RPCs). Although laws and regulations regarding housing and settlements are comprehensive, the complexity of administrative systems and capacity gaps in enforcing regulation have resulted in extensive illegal construction in environmentally-sensitive and at-risk areas.

Insurance Cover for Houses and Contents: The National Disaster Relief Services Centre of the Ministry of Disaster Management formalized the National Natural Disaster Insurance Scheme, which was implemented through the National Insurance Trust Fund covering all common natural disasters in Sri Lanka, excluding drought. It has been effective from April 1, 2016. This Scheme, which was amended in March 2017, covers houses and its belongings affected by natural disasters, excluding drought. Houses valued above LKR 10 million, and those covered for disaster-related impact by other insurance companies are excluded from the Scheme. In the assessment of damages, the maximum compensation for housing damage is LKR 2,500,000 per house per event as per the scheme.[9] However, the level of awareness of the general public regarding this scheme is not adequate.

Housing Finance: The Ministry of Housing plans to reach 50,000 low-income rural or semi-urban households through its 'Samata Sevana' concessionary housing loans scheme.[10] As of now, the majority of housing loans are provided by commercial lending institutions, including banks at commercial lending rates. However, the proof of land ownership and the ability to provide collateral, are limiting factors in accessing housing loans from commercial lending institutions, particularly for households employed in the informal sector.

1.3. POST-DISASTER EFFECTS

Destruction of Infrastructure and Effects

6. http://www.statistics.gov.lk/PopHouSat/CPH2011/Pages/Activities/Reports/CPH_2012_5Per_Rpt.pdf
7. Ministry of Housing
8. Housing needs Assessment and Data Survey 2016 – Ministry of Housing
9. National Natural Disaster Insurance Policy of 31st March 2017
10. http://www.nhda.lk/index. php/en php/en/our-services/housing-loans

The floods and landslides of May 2017 affected 77,309 houses. 74,301 houses suffered from partial damage and 3,008 were fully damaged (over 75% of physical damage). Of the total number of houses affected, 71 houses were partially damaged and 100 houses were fully damaged due to landslides.[11] In the aftermath of the May 2017 disaster, 2,131 houses located in areas at high risk from landslide damage were identified by NBRO based on landslide susceptibility maps to be relocated, from a total of over 15,000 households proposed to be relocated from other high-risk areas in the country.[12]

Although the disaster affected urban, rural, as well as plantation settlements in the target districts, the major impact was on rural settlements. The rural settlements affected by floods and landslides have low population density and are dependent on agriculture as the primary economic activity. With limited access to physical infrastructure and services, they do not have means to access alternate means of livelihoods, thereby pushing them towards a life of abject poverty. Agriculture, being highly vulnerable to climate-induced disasters, the poor farming community is caught in a vicious cycle of poverty due to recurrent disasters.

A high percentage of improvised and semi-permanent houses were affected by the disaster in rural areas, mainly due to flooding. These houses had weak foundations, and walls were mainly constructed out of wattle and daub, with poor resistance to flooding. However, a high number of permanent houses in rural areas were also affected due to the intensity of the currents in flood waters, as well as the landslides.

The urban areas of Galle, Matara and Ratnapura municipalities and Kalutara Urban Council areas were affected mainly by floods. These areas are frequently affected by floods due to the high density of construction in low-lying flood plains. Although the exact statistics are not available, a high percentage of houses constructed in these areas are illegal constructions encroaching on to reserved and water-retention areas. While a high percentage of improvised and semi-permanent houses were affected, permanent houses also got affected due to the prolonged duration of floods and the intensity of the currents.

Regarding the Estate sector, 341 houses were fully damaged due to the landslides in the Central and Uva Provinces. These houses were between 200 -550 sq. ft. in size, and were owned

11. NDRSC, District and Divisional Secretaries
12. NBRO

TABLE 9: DAMAGE AND LOSS ESTIMATES
SOURCE: NDRSC

	Type of damage	No. of units	Cost (LKR Million)
Damage	Fully damaged	3,008	5,069.42
	Partially damaged	74,301	16,651.42
	Household assets	77,309	7,326.23
	Total Damage		**29,047.07**
Losses	Loss of rental	40	4.80
	Debris clearing	77,209	415.13
	Temporary shelter provision and rent allowance	77,309	818.80
	Emergency cash grant	72,891	728.91
	Maintenance of safe locations (332 families)		24.90
	Total Losses		**1992.54**
Total Effects			**31,039.61**

by the Regional Plantation Companies.[13] These houses are classified as semi-permanent (as in the case when it comes to line rooms), or permanent in the case of newly-constructed detached houses.

Inadequate early warning, the rapid onset of the disaster, and prolonged duration of flooding in many affected areas, resulted in a high degree of damage to life and household assets. The communities were not prepared adequately to respond to disasters due to lack of preparedness in terms of measures that were to be adopted prior to the disaster. Moreover, the local-level officials and humanitarian organizations did not have the capacity to support them. Therefore, the disaster-affected communities opted to return to their original places of residence or are staying with host families. It was observed that some families use the safe locations for sleeping at night, while others occupy them during the day, hoping to receive assistance.[14] While tents are not a safe or durable option in local conditions, provision of transitional shelter assistance and emergency shelter repair assistance when safe land is available, and rental support, are key requirements. Moreover, removal of debris from damaged houses is a crucial need. Many households have salvaged reusable and recyclable materials for reconstruction. However, there needs to be a provision for the disposal of material that cannot be reused in a sustainable manner, to prevent further environmental degradation.

1.4. IMPACT ANALYSIS ON DEVELOPMENT GOALS

Human Impact: Schools, places of worship, and other public buildings served as emergency shelters for people displaced by the disaster. However, in most districts, these facilities were discontinued once the floodwater receded. Affected families returned to their own damaged houses, or opted to live with host families mainly friends and relatives. A few welfare camps for persons affected by landslides continued to function for a longer period of time in Ratnapura and Matara districts. Families, whose houses were fully damaged, but who allowed to return to their home plots, were provided with tents or constructed improvised structures, while those with damaged houses carried out emergency repairs to make the houses habitable. It is estimated that 40 rental houses were fully damaged from the disaster. Finally, the third category of renters (those without permanent or semi-permanent dwellings), as a general rule, continue to receive little assistance after the disasters, and face challenges in finding alternative accommodation, while owners of rental houses suffer from loss of rental income.

Water supply to Matara Municipal Council was disrupted as the pumping station upstream was inundated. This resulted in communities in Matara town being unable to support flood affected households by providing accommodation.[15] Conflicts has been reported between some host families in Ratnapura, as the host families did not receive any form of assistance, although they are burdened by the responsibility of providing accommodation to displaced families.[16]

Economic Impact: Sri Lanka's balance of payments may be negatively impacted due to increased import of construction material including cement, steel and timber, as reconstruction in the aftermath of the 2016 and 2017 disasters will result in increased demands.

1.5. CROSS-CUTTING ISSUES

Disaster Risk Reduction: Some landslide-affected households suffered loss of life and assets due to living in high-risk areas, although alternative land for relocation was allocated to them. It was also evident that the location of

13. Ministry of Hill Country New Villages, Infrastructure and Community Development
14. Field visits from shelter sector
15. Field observations
16. Shelter sector field visits

houses and commercial establishments in highly flood-prone areas was a main causal factor for severe damages to buildings.[17] Poor quality of construction and structural designs that cannot withstand flooding and high winds, suffered from severe damage, as has been evident in damage statistics.[18] A detailed analysis of damage indicates that a high percentage of improvised houses and semi-permanent houses were affected due to the usage of construction material and techniques that offered poor resistance to flooding. In rural areas, it was observed that many wattle and daub houses were severely affected, whereas timber structures and mud walls have been completely destroyed.

Gender and social aspects: Privacy for women and girls in living spaces, segregated sanitation facilities, including menstrual hygiene management were major concerns in safe locations/welfare centres, as these spaces were not specifically designed or prepared for the purpose. Lactating mothers faced severe hardships in feeding their infants in these centres.[19] Similarly, accessibility for the elderly and persons with disabilities was also a concern. Kitchens and toilets are the most damaged sections of the houses, which have negative implications for the daily activities of women and girls.[20] The absence of gender disaggregated data is a critical concern, as it is crucial in determining and providing need-based assistance to the affected.

With reference to recovery, it is not clear how the issues of landownership and house ownership, accessing grants, loans, and insurance schemes, have been addressed from a gendered perspective, specifically ownership and access issues by women and girls, when they are not the 'Head of the household'.

17. UN-Habitat field assessments
18. NDRSC
19. IOM Assessment Report 31st May 2017
20. UN-Habitat field assessments

Environment: Poor patterns of land-use and practices have been highlighted by communities and professionals as factors that significantly aided the impact of the disaster. Communities attribute many landslides in Kalutara District to uprooting of rubber plantations to provide raw material for MDF manufacturing and conversion of forest land for tea cultivation in other areas. In Matara District, unstable river banks, which are a result of sand mining, resulted in the uprooting of Bamboo bushes along the banks by the force of flood waters, which help in blocking path of the river in many places. Blocking of downstream waterways and construction in water retention areas, have been attributed to prolonged flooding. Recovery and reconstruction may also pose threats to the environment, such as extensive harvesting of jungle poles and bamboo for temporary construction, and illegal sand mining to meet increased demand during reconstruction. Inappropriate disposal of debris, including filling of low-lying water retention areas and dumping in ecologically sensitive areas are of concern. Further disposal of landslide-related debris is highly discouraged as it could destabilize the soil and result in aggravating landslides and slope failures.

Livelihood: In addition to loss of rental income due to housing damage, home-based livelihoods have been affected due to loss of assets and work spaces. Assessments are in progress to analyse the damage to MSMEs including home-based livelihoods, which are covered by the National Natural Insurance Disaster Insurance Scheme. Home-based livelihoods were affected mainly due to loss of assets related to food preparation for selling, roadside shops selling daily requirements, and seasonal local products mainly operated by women. Other home-based livelihoods that were affected include processing of agricultural produce including cinnamon and pepper, handicrafts making and tailoring, etc., due to negative impact on raw materials.

Home-based service industries such as vehicle repair facilities have also been affected.[21]

1.6. RECOVERY NEEDS AND STRATEGIES

Recovery needs (please refer estimation details in methodology for information of recovery need calculation)

21. Field visit observations by UN-Habitat

Recovery Needs

Early recovery needs address immediate contingencies including life-saving shelter assistance and measures to ensure that affected families do not remain homeless until permanent housing assistance is provided. The major components of the medium-term and long-term recovery strategy consist of housing reconstruction needs, including costs incurred in relocating landslide affected households and those in high risk locations, and the replacement of household effects damaged by

TABLE 10: RECOVERY NEEDS ESTIMATES

Duration	Activity	Cost (LKR.Million)
Short term (December 2107)	Provision of 1472 tents @ LKR. 60,000	88.32
	Construction of 601 transitional shelters @ LKR. 150,000	90.09
	Emergency repairs for partially damaged houses 36,807 @ LKR. 15,000 per unit	552.11
	Debris clearance for partially damaged houses 74,301 @ LKR.5000 + 2,908 fully damaged houses @ LKR. 15,000	415.13
	Emergency cash grant from NITF for 72,891 households @ LKR. 10,000	728.91
	Rent allowance for 3918 households @ LKR. 7,500 per month for 3 months	88.16
	Maintenance of safe locations/welfare camps for 332 households @ LKR. 25,000 per month for 3 months	24.90
	Total early recovery needs	**1987.62**
Medium term (2018-19)	Repair cost for housing damage for 74,301 flood affected houses @ LKR. 200,000	14,860.20
	Reconstruction cost for 2 908 Fully damaged houses affected by flooding @ LKR. 800,000	2,326.40
	Reconstruction cost for landslide affected and high landslide risk houses (2,302 houses @ LKR. 1,200,000)	2762.40
	Land grant for relocation of landslide affected and high landslide risk families (2,302 houses @ LKR. 400,000)	920.80
	Land preparation cost for 2302 plots @ LKR. 120,000	276.24
	Technical support and monitoring of reconstruction (6% of total construction cost)	1196.94
	Improvement to housing data collection and management system	15.00
	Replacement cost of household assets for 77,309 houses @ LKR.25,000	1932.73
	Total medium-term needs	**24,290.71**
Long term (Annexure 6) (2019 onwards)	Multi-hazard risk mapping for Western, Central, Uva, Sabaragamuwa and Southern Provinces	50.00
	Development of physical and land use plans incorporating hazard maps and Climate Change adaptation measures	20.00
	Improving regulatory system for enforcement of building regulations as per the physical and land use plans	10.00
	Mainstreaming DRR and Climate change adaptation measures into the construction industry	20.00
	Addressing residual housing needs by including BBB principles and replacement of household goods	54,914.76
	Total long-term needs	**55,014.76**
Total needs		**81,293.09**

flooding. Recovery needs have factored 'Build Back Better' principles in order to bolster resilience of affected communities in the face of future hydro-meteorological disasters. The needs which can be addressed with existing and proposed government assistance packages are classified as medium-term needs, while those to be addressed by the affected households through self-recovery or access to sustainable housing finance are classified as long-term needs.

Recovery and Reconstruction Strategies

All recovery and reconstruction strategies are guided by the global development frameworks to ensure that affected communities have improved access to safe and inclusive housing and settlements with increased resilience. Key global development frameworks guiding the housing reconstruction strategies include: Goal 11 of the Sustainable Development Goals; New Urban Agenda 2030; Sendai Framework for Global Disaster Risk Reduction 2015–2030 and 'Build Back Better' principles.

Although owner-driven approach with voluntary relocation is recommended as the most preferred option for housing reconstruction, community driven housing in land allocated by the GoSL is another option in scenarios where home owners lack the capacity to engage in the construction of their own houses in landslide-affected areas, particularly in the Estate sector. In other instances, engaging the military in housing reconstruction in green field resettlement sites for landslide-affected households should be considered as an alternative. However, ensuring the active participation of affected communities including women in the decision-making process should be ensured under this approach. The contractor-driven approach should only be adopted as a last resort.

Low-risk Certification of resettlement sites issued by NBRO for landslide-affected households is a pre-requisite to minimize future landslide risks. The dissemination of minimum standards and construction guidelines among all stakeholders engaged in the reconstruction, along with the provision of adequate technical support, and close monitoring and certification of construction quality are key when it comes to ensuring that reconstructed housing is resilient in the face of future disasters.

Housing assessments and data management: The timely availability of adequate and accurate data required by all stakeholders in the housing sector, after the disaster, was a key challenge faced both in 2016 and 2017. The lack of an updated housing database at the local level was a key challenge while validating the damages to housing and contents. The validity of data collected during assessment for National Disaster Insurance compensation for damaged houses and content, resulted in delays and disputes in pay-outs in 2016. According to the data released by NDRSC, the type of data collected and data collection methodologies have varied among districts in 2017. Similarly, some of the key data for the calculation of damages and losses in the Housing, Land and Settlements' chapter were based on assumptions and estimations. In 2017, the degree of partial damage to houses was approximated at 12.5% by NDRSC, based on the average compensation payout by the NITF for housing damage. This approximation raises concerns about the accuracy of the approximation, as over 2,900 houses have been fully damaged by the floods. Therefore, a low percentage of damage cannot be applied to the remaining caseload, as there should be several degrees in between 12.5% and 75%. Therefore, the establishment of annually updated databases, and streamlining of assessments for insurance payments, are key to ensuring equitable compensation for all affected persons in the event of future disasters. Lastly, capacity building of all stakeholders involved in the data collection and management process and formalizing the system are primary requirements to ensure the equity as well as the sustainability of the process.

Early Recovery Strategies

The closure of welfare centres, while ensuring that affected households are able to find safe temporary accommodation is the key requirement in the housing sector during the Early Recovery Phase. The GOSL will provide a rent allowance of LKR 7500 per month per fully damaged house or relocation to a safe location for a period of three months. NDRSC has received 3,918 applications for rent allowance from the target districts.[22] However, it is unlikely that the demand for rental housing can be met in rural areas, which accounts for the highest number of fully damaged houses. Alternative accommodation in the form of transitional shelters and emergency repairs should be provided for affected households. Recycling and reusing building materials, promoting the use of sustainably-sourced local material, the construction of upgradable transitional shelters, and ensuring that transitional shelters are located in low-risk areas, are essential for sustainable early recovery. (Table 11)

Medium-term Reconstruction Strategies

While the main housing reconstruction strategies, such as voluntary resettlement, owner-driven housing, resettlement in green field sites, community-driven reconstruction, construction by the military, and contractor driven construction and their contextual applicability have been discussed under 'Recovery and Reconstruction Strategies' above, and further elaborated in the 2016 PDNA Report, context-specific financing and reconstruction strategies have been outlined below.

- **Financing reconstruction:**

Compensation through the National Natural Disaster Insurance Scheme will partially cover the cost of damage to housing and contents. However, these funds will not be adequate to cover all housing reconstruction needs incorporating 'Build Back Better' features, including structural disaster mitigation measures. Alternative financing mechanisms funded by GoSL and or donors are required for housing reconstruction. The unit costs for the construction of a house was estimated based on the type of hazard and structural mitigation measures required in construction, along with ensuring equity with other housing assistance programmes for disaster and conflict-affected communities. The compensation paid out through the National Natural Disaster Insurance Scheme is LKR 25,000 for replacement of household goods per house. It is expected that the remaining replacement cost of goods will be borne by affected households through self-financing or Non-Food Items (NFI) support from donors.

- **Flood-affected houses**

The cost of reconstruction of a fully damaged house of 550 sq. ft. to minimum standards has been estimated at LKR 800,000 and a partially damaged house at LKR 200,000 to ensure

22. NDRSC

TABLE 11: EARLY RECOVERY IMPLEMENTATION STRATEGY

Activity	Implementing agencies	Possible Source of funds
Construction of transitional shelters	UN-Habitat, IOM and other humanitarian agencies	Donors and UN emergency funds
Temporary shelter repairs	UN-Habitat, IOM and other humanitarian agencies	Donors and UN emergency funds
Rent allowance	NDRSC, District and Divisional Secretaries	GoSL
Emergency cash grant	NDRSC, District and Divisional Secretaries	NITF

equity with housing assistance to other disaster-affected households. This amount is to be partially compensated by insurance for the majority of affected households. It is proposed that this amount be topped up to meet the estimated cost, either through concessionary loans to affected households, or grants to extremely vulnerable households.[23] It is recommended that the loans and grants be provided through the Ministry of Housing and Construction on the same terms of existing programmes.

- **Landslide-affected houses and relocations due to landslide risk**

Compensation payments through insurance will not be directly paid to landslide-affected households. GoSL will provide a housing reconstruction grant of LKR 1,200,000 for reconstruction per house fully or partially damaged by landslides, or those affected will be relocated due to high risk. This will be supplemented by the provision of a plot of land in a low-risk area or a land grant of LKR 400,000. A further LKR 120,000 per plot (30% of the land value) is required for site preparation and basic infrastructure provision in green field sites. However, this may be lower in instances where voluntary relocation takes place. This model is being currently implemented in locations affected by the 2016 landslides. In the Estate sector, affected households will be provided with 7 perches of land instead of the aforementioned land grant.[24] The purchase of land and a house in a safe location up to the value of LKR 1,600,000 is another alternative as per the guidelines of NBRO. (Table 12)

Long-Term recovery strategies

The long-term reconstruction strategies for the 2017 disaster emphasizes on capacity building, and mainstreaming DRR and Climate Change Adaptation in the construction industry as key to integrating structural mitigation measures into construction. In addition, addressing residual housing needs to ensure that all affected households have upgraded their houses inclusive of the 'Build Back Better' principles, to conditions surpassing those which existed prior to the disaster, has also been considered.

Rethinking land use: Considering the increased frequency and intensity of flooding in the target districts, it is essential that existing land use plans be revisited to assess the impact of climate-induced disasters and revised to minimize recurrent damage to housing and settlements. Formulation and revision of multi-hazard risk maps for landslide and floods is a main resource required for the revision of land-use plans. Considering the physical and economic vulnerabilities of affected rural areas, it is proposed that future plans for reconstruction and development of these settlements consider medium-density settlements in low-risk areas with alternative employment and livelihood opportunities resilient to climate change impacts and disasters, incorporating centralized environmental services to further reduce the risk of disasters. Revision of building regulations based on levels of risk, revised land-use plans, and strict enforcement, are critical for the sustained reduction of risks in all locations.

Addressing Residual Housing Needs: Housing needs which cannot be addressed through the government's assistance packages are included in the long-term reconstruction strategy. This includes reconstruction of all affected houses by incorporating 'Build Back Better' principles. It is proposed that affected improvised and semi-permanent houses be upgraded as permanent houses with a minimum floor area of 550 sq. ft. to be equitable with other vulnerable communities affected by disasters, including ethnic conflict. It is also proposed here that affected permanent houses be reconstructed and retrofitted to reduce their

23. Extremely vulnerable households are categorized here as low-income households which are either headed by minors, females, elderly or consisting of persons with disabilities.
24. Ministry of Hill Country New Villages, Infrastructure and Community Development.

TABLE 12: MEDIUM TERM RECOVERY AND RECONSTRUCTION STRATEGY

Activity	Implementing agencies	Possible Source of funds
Repair of partially-damaged flood affected houses	NHDA, NDRSC, District and Divisional Secretaries, Local Government Authorities, UN and development agencies and home owners	NITF, GoSL, affected households, donors
Reconstruction of fully damaged flood affected houses	NHDA, NDRSC, District and Divisional Secretaries, Local Government Authorities, UN and development agencies and home owners	NITF, GoSL, affected households, donors
Relocation and reconstruction of landslide affected and high-risk houses	NDRSC, NBRO, District and Divisional Secretaries, Local Government Authorities, UN and development agencies and home owners/ communities/military	NITF, GoSL, affected households, donors
Replacement of household assets	NDRSC, affected communities	NITF, affected households, donors
Improvement to housing data collection and management system	UNDP, UN-Habitat, Ministry of Housing	GoSL, donors

TABLE 13: LONG-TERM RECOVERY STRATEGY

Activity	Implementing agencies	Possible Source of funds
Multi-hazard risk mapping for Western, Central, Uva, Sabaragamuwa and Southern Provinces	DMC and Technical agencies with respect to different hazards; Irrigation Dept., NBRO, Coast Conservation Dept. etc. agencies,	GoSL/Donors
Development of physical and land use plans incorporating hazard maps and Climate Change adaptation measures	NPPD, Ministry of Mega polis and Western Development, UN-Habitat, UNDP, Ministry of Local Government and Provincial Councils, UDA	GoSL/Donors
Improving regulatory system for enforcement of building regulations as per the physical and land use plans	Ministry of Local Government and Provincial Councils, Ministry of Mega polis and Western Development, UDA	GoSL
Mainstreaming DRR and Climate change adaptation measures into the construction industry	UN-Habitat, Disaster Management Centre, Ministry of Higher Education, Ministry of Vocational Training (NAITA, VTAs)	GoSL/Donors
Addressing residual housing needs	Beneficiaries, Local Government Authorities, Technical service providers (NHDA/NBRO), local banks	Beneficiaries/ banks

vulnerability to future hydro-meteorological disasters. Replacement of household goods to their current value is also included in long-term recovery strategies. The financing of long-term needs can be achieved through self-recovery or improved access to sustainable housing finance for affected households. It is highly recommended that houses and townships affected by annual flooding be relocated to reduce their vulnerability. Ensuring the enforcement of no-build zones is also a priority for the sustainability of relocation. (Table 13)

1.7. IMPLEMENTATION STRATEGY FOR RECOVERY

For effective and sustained implementation, the mandated agencies for housing National Housing Development Authority (NHDA) under the Ministry of Housing and Construction, Ministry of Hill Country New Villages, and local governments should be the lead agencies. In order to ensure that construction incorporates disaster risk reduction elements, agencies with the required technical know-how such as NBRO, Central Engineering Consultancy Bureau (CECB), State Engineering Corporation, along with the provincial set up as well as District and Divisional Secretariats should be actively engaged. UN and other humanitarian agencies can be collaborative partners.

1.8. ASSESSMENT METHODOLOGY

Estimation of damage to housing

Detailed data for housing damage was provided by NDRSC based on damage data provided by the respective Divisional Secretaries. Housing type as per the census classification was used as the basis of estimation, together with the floor area of houses categorized into three categories as given below:

The size in each housing size was unified for calculation purpose:

- For less than 46.4515 m2 (500 sq. ft.): (Max size 46.3586 m2 + Minimum liveable size 18.5806 m2) / 2 = 32.4696 m2 (350 sq. ft.)
- For with or above 46.4515 m2 and below 92.903 m2 (500-1,000 sq. ft.): (Max size 92.8101 m2 + Minimum 46.4515 m2) / 2 = 69.6308 m2 (750 sq. ft.)
- For above 92.903 m2 (>1,000 sq. ft.): 92.903 m2 (1,000 sq. ft.)

The damage was classified as partial -12.5% and fully damaged – not-repairable or > 75% with consensus of NDRSC officials. The rates for damage calculation of damages were based on the rates provided by NBRO. Table 14 below provides a summary of rates calculation for houses by type and size. The degree of damage for fully damaged houses was estimated as 100%.

The housing damage was calculated by the following equation: rate (LKR million) for house by type and size category * degree of damage (partial or fully) * = total damage (LKR million). (Table 14)

TABLE 14: SUMMARY OF RATES FOR CALCULATION OF DAMAGE BY HOUSING TYPE AND SIZE

Type	Improvised Housing (LKR)		Semi-Permanent Housing (LKR)		Permanent Housing (LKR)	
Size range (ft2)	<500ft2	500 x<1000 ft2	<500ft2	500 x<1000 ft2	500 x<1000 ft2	1000 ft2
Rate/ ft2 (LKR)	460	480	1,160	2,590	3,620	3,620
Size used for calculation (ft2)	350	750	350	750	750	1,000
Bathroom	20,000	20,000	30,000	30,000	65,000	65,000
TOTAL	**181,000**	**380,000**	**436,000**	**1,972,500**	**2,780,000**	**3,685,000**

TABLE 15: VALUE OF ASSETS (LKR) AS PER HOUSING TYPE AND SIZE

Type	Improvised Housing (LKR)		Semi-Permanent Housing (LKR)		Permanent Housing (LKR)	
Size range (ft2)	<500ft2	500 x<1000 ft2	<500ft2	500 x<1000 ft2	500 x<1000 ft2	1000 ft2
Rate	15,000	45,000	75000	130,000	325,000	500,000

Household goods

Data for household goods was not available, either in the Housing and Population Census of 2012, or the Household Income and Expenditure Survey of 2012/13. Therefore, 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 partially damaged due to the influx of water or debris even in minor damaged houses. Therefore, an average of 50% of the value of assets was applied for all affected houses. As there was no data on asset loss in undamaged houses, the estimates have been assumed as conservative. (Table 15)

Estimation of Losses

Loss of rental allowance

The exact number of rental houses damaged was not known. Moreover, as the urban areas, in all districts were severely affected by the disaster, the percentage of rental houses from the total housing stock in each district from the 2012 census was extrapolated to the number of fully damaged houses. This was done to arrive at an approximate figure for the number of rental houses damaged. An average value of LKR 10,000 was used as the rental per month, and the period of rental loss was assumed as 12 months.

Cost of environmental cleaning/ debris clearance

Debris cleaning was calculated for flood-affected houses, as it was considered dangerous to clear debris which was the result of the landslides. The rate for debris cleaning per fully damaged house was estimated at LKR15, 000, and LKR 5,000 per partially damaged house.

Temporary shelter

1,472 tents were provided by NDRSC to households whose houses were fully damaged. The cost per tent was estimated at LKR 60,000 as estimated by the shelter sector coordination team. The number of transitional shelters required was calculated at 20% of the total number of houses fully damaged and the cost was estimated at LKR 150,000. The cost of emergency shelter repairs was estimated at LKR 15,000 by the shelter sector coordination team. It was assumed that 50% of the partially damaged shelters required emergency repairs to make the house habitable.

Rent allowance

The calculation of rent allowance was based on the number of households who had applied for rent allowance to NDRSC. The allowance is LKR 7500 per month per household for a period of 3 months.

Emergency cash grant

NRDSC figures were used to arrive at the number of households entitled for the emergency cash grant of LKR 10,000. This is a one-time payment to be deducted from the National Disaster Insurance Compensation Payment.

Safe location management

The number of families in safe locations was obtained from the Disaster Management Centre, and the cost per family was estimated at LKR 25,000 for a period of 3 months for calculation purposes.

Estimation of Needs

Short-term needs:

Debris cleaning, safe location management, provision of emergency shelter, rental, and emergency cash grant: The cost of these needs was calculated as being equal to the loss incurred for the same as given above.

Actual Housing Reconstruction Needs: The estimates for actual housing reconstruction, including replacement of household goods, were based on incorporating 'Build Back Better' principles and maintaining equity with other housing assistance programs. Estimates are based on ensuring that the size and type of house will be restored or upgraded from pre-disaster conditions. In summary:

- All improvised houses affected are to be replaced with permanent housing of 550 sq. ft. @ LKR 800,000 per house.
- Semi-permanent houses < 500 sq. ft. with partial damage are to be upgraded to permanent housing of 550 sq. ft. @ LKR 436,000 * 1.4, and fully damaged @ LKR 800,000.
- Semi-permanent houses of 500-1,000 sq. ft. with partial damage @ LKR1, 972,500 *.5 to be upgraded to permanent housing, and fully damaged @ LKR 2,780,000.
- Permanent Houses of 500-1,000 sq. ft. Partial damage @ LKR 2,780,000 *.25, and fully damaged @ LKR. 2,780,000@1.1.
- Permanent houses >1,000 sq. ft.: Partial damage @ LKR 3,685,000 *.25, and fully damaged @ LKR 3,685,000 * 1.1.
- Land grant for 2,303 houses to be relocated @ LKR 400,000 as per the government policy.
- Land preparation cost for relocated plots @ LKR120, 000 (30% of land grant).
- Housing grant for additional high landslide-risk families (1,861 Nos.) @ LKR 1,200,000.
- Replacement of household goods at cost (equal to value of damage).

Medium-term Needs:

Construction of permanent houses

The following assumptions and guiding principles were used for the estimation of housing reconstruction needs:

Medium-term needs are calculated based on the GoSL's existing and proposed assistance packages, because meeting all reconstruction needs are not practical through assistance packages.

The estimates for reconstruction are based on the 'Home Owner Driven Approach' and do not include the contractor's overheads.

All houses, fully or partially damaged by landslides and those in high-risk areas identified to be relocated will require a reconstruction grant of an estimated LKR 1,200,000 as per Cabinet approval (already obtained) to incorporate structural mitigation measures stipulated by NBRO. A land grant of LKR 400,000 has also been estimated for the relocation of these houses. LKR 120,000 (30% of the land grant) is required for land preparation and provision of basic infrastructure in green field sites.

No land grant has been provided for flood-affected houses as a majority of the houses will be constructed in-situ in the original place of residence and the number of houses to be relocated is not known.

6% of the housing reconstruction costs have also been added as the cost for the provision of technical support is in line with other government implemented programmers.

The cost of replacement of household assets stands at LKR 25,000 as per the compensation package of NITF.

Long-term needs:

Land-use planning, mainstreaming DRR in construction and capacity building of service providers for 'Build Back Better' and other technical and social criteria: These costs are indicative and are based on costs incurred for similar activities.

Residual Housing Needs: The value of residual housing needs = Total actual housing reconstruction cost inclusive of relocation cost and replacement of household goods – medium-term housing reconstruction needs inclusive of relocation costs and insurance compensation for loss of household goods. ■

2. Education

2.1. EXECUTIVE SUMMARY

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

This assessment covers pre-schools and general school education (grades 1–12). Both education sectors suffered damages and losses in Kalutara, Ratnapura, Galle, Matara and Hambantota districts. The chapter provides estimates of the recovery and reconstruction needs using the principle of 'Building Back Better'. The damages and losses for the sector have been 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, specifically in the drafting of the report, and gathering relevant information from district education offices to supplement the data provided by the MOE.

Due to the floods, a total of 382 pre-schools have been affected, out of which 118 pre-schools are located in Matara, 113 in Ratnapura, 90 in Kalutara, 59 in Galle and 2 in Hambantota district, affecting approximately 11,460 students. The damage to preschool buildings, furniture, learning materials, stationery and utensils has been estimated at LKR 23.60 million.

The net value of the total damages and losses to the education sector has been estimated at LKR 1417.80 million at pre-disaster prices. Of this, the damage to infrastructure and physical assets is LKR 1,084.8 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, 96 percent accrues to the public sector, and only 4 percent to the private sector.

The total recovery and reconstruction needs for the education sector for the next three years (fiscal years 2018–2020) using the principle of 'Building Back Better' is expected to cost LKR 1,515.65 million. The recovery strategies and specifically short-, medium- and long-term needs are described in the main text.

2.2. 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 Non-Governmental Organisations (NGOs) and other non-government entities. On average, ECCD centres are resource constrained and inadequate lacking in 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 disabilities or those with learning difficulties.

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 is taken by the majority of children. The results are used to provide modest bursaries for poor 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 Certifi-

cate Examination (GCE) Ordinary Level, which is the end point of secondary education. Enrolment in Advanced Secondary Education for grades 12-13 is subject to performance at the Ordinary Level. The educational needs of out-of-school children are addressed through Non-Formal Education (NFE) programmes. There is a NFE branch in the 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%) attend government schools. In 2015, there were 10,144 schools. A majority of them were state funded, 98 privately funded and 743 Pirivena schools which are primarily for Buddhist monks. There are two national languages and English has been coined the link language. Accordingly, the medium of instruction can be Sinhala or Tamil and for a small minority English (1.4%). 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; and occasionally a grade span of 1-8.

Almost all schools offer primary education (96 %), 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 a majority of the 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 has declined rapidly from 11 percent in 2006 to 9 percent in 2011. The total government expenditure on education as a proportion of GDP has also declined from 2.7 percent in 2006 to 1.7 percent in 2012[25]. This is the smallest share of public investment in education among the countries in the region, as well as 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.[26] The allocations are mainly used for recurrent expenditures such as salaries (75%) and only 20 percent on quality. However, following the Presidential Election in January 2015, the Finance Minister of the National Unity Government, during the interim budget speech, stated 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.[27] Due to the high cost incurred by families, children from lower-income quintiles are more likely to drop out of school.

25. UIS UNESCO 2015
26. World Bank 2013
27. Central Bank of Sri Lanka

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, the Household Expenditure Income and Expenditure Survey (HEIS 2009/10) indicate that only 46 percent of 3-5 year olds are enrolled in pre-school. In the sectors of primary and lower secondary education,[28] Sri Lanka has achieved close to universal participation. The primary education net enrolment rate (2012) is 93.8 percent, with gender parity,[29] and the survival rate to Grade 5 is 97.39 percent, with boys (96.86 %) trailing slightly behind girls (97.93%). Net enrolment at the secondary level (2012) is lower, at 85.4 percent (87.5% girls and 83.4% boys). The percentage of out-of-school children at the primary level is low, estimated to be at 1.9 percent (1.9%male and 1.8% female).[30] This amounts to an estimation of 103,178 children, out of primary school. Children of primary age who are out of school are more likely to be from the Estate sector rather than rural or urban areas,[31] and are 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 National Education Research and Evaluation Centre (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. When it comes to the pre-school sector, there is disparity in access to resources among urban, rural and the estate sector as it is mainly financed by the non-government and civil society organizations. The pre-schools in the rural and plantation sector have fewer resources than the pre-schools in the affluent urban areas.

Central and Uva Provinces are also low performers due to the presence of a large tea estate population, which has been 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) as 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.

2.3. POST-DISASTER EFFECTS

This section describes the effect of damages and losses resulting from the flooding on the education sector. It includes analysis regarding

28. Department of Census of Statistics 2013, Household Income and Expenditure Survey 2012/13
29. UIS 2015
30. UNICEF 2013
31. UNICEF 2013

the total or partial destruction of infrastructure and assets; disruption of service delivery and production of goods and services; disruption of sector governance; and emerging risks and vulnerabilities. (Table 16)

Due to flooding, a total of 382 pre-schools were affected, out of which 118 were in Matara, 113 in Ratnapura, 90 in Kalutara, 59 in Galle and 2 in Hambantota district affecting approximately 11,460 students. The damage to pre-school buildings, furniture, learning materials, stationary and utensils has been estimated at LKR 23.60 million.

The net value of the total damages and losses to the education sector is estimated at LKR 1417.8 million at pre-disaster prices. Of this, the damage to infrastructure and physical assets is estimated at LKR 1084.8 million. Overall, the public sector suffered more damages and losses when compared to the private sector. More specifically, of the total impact, 88 percent accrues to the public sector and only 12 percent to the private sector.

A total of 336 schools have also been damaged to varying degrees out of a total of 2,122 schools in the Kalutara, Ratnapura, Galle, Matara and Hambantota districts. While some schools suffered substantial damages to their physical infrastructure, other schools experienced minor damages to infrastructure, along with damages to assets and equipment. The district-wise breakdown of damages is presented in the Table 17.

While Kalutara, Ratnapura and Matara districts suffered the most damage to schools ranging from 16–33%, in financial terms, Ratnapura district recorded the highest damage to infrastructure and physical assets of government schools, followed by Kalutara and Matara districts respectively. In their respective districts (33-16%), Galle and Hambantota districts recorded less than 6% damage to the numbers of schools.

62 schools have reported full damage to school buildings, while 248 schools have suffered from partial damages to flooring, roofing, walls, fencing, and water and sanitation facilities. Furniture used by students, teachers and officers has been damaged in all 336 schools. Equipment belonging to computer labs, science labs, home science units, aesthetic rooms, sports units, and audio video units, has also been damaged as water levels went up in the schools.

In addition, 3 Technical College, 3 Vocational Training Authority Centres, 5 National Youth Corporative Centres, and 1 National Youth Services Council Centres have also suffered damages amounting to LKR 14.6 million.

The National Building Research Organization (NBRO) has recommended the relocation of 4 schools due to their location in high-risk areas susceptible to floods and landslides.

Effects on production of goods and services and access to services

A majority of the affected schools could not function for 1 week from May 29 to June 5, 2017. However, 15 schools in Sabragamuwa, 29 schools in the Southern Province and 10 schools in the Kalutara district were reopened for school activities only after 2-3 weeks. In addition, the floods also caused 49 schools to be used as temporary shelters to house the displaced persons. A majority of them (26) were located in Ratnapura, 11 in Kalutara, 2 in Galle, 7 in Matara and 3 in Hambantota. This disrupted normal school activities of the children for 2-3 weeks. These children though, were provided with facilities to attend nearby schools. Some displaced persons are still using a few school ground premises as IDP camps. In Ratnapura district, 3 Temporary Learning Centres have been erected as schools have suffered damages.

Effects on sector governance functions and systems

No major damages were reported to Government offices including education administra-

TABLE 16: POST-DISASTER EFFECTS (DAMAGES AND LOSSES BY PUBLIC/PRIVATE MANAGEMENT)

Disaster effects	Assumption /Comments	LKR million		
		Public	Private	Total
Damages to infrastructure and assets				
Cost of fully damaged schools	62 school buildings fully damaged	620	0	620
Cost of partially damaged schools	248 schools partilly damaged: floors, roof, walls, fencing and water and sanitation facilities	171.5	76.4	247.9
Cost of damage to furniture	Furniture used by students, teachers and officers damaged in all 336 affected schools.	40.3	57.3	97.6
Cost of damage to equipment	Equipment of the Computer lab, Science lab, Home science unit, Aesthetic room, Sports unit and Audio video units have been damaged	201.5	0	201.5
Cost of damage to pre-schools	Damages to 382 pre-schools, furniture and learning materials.	0	23.6	23.6
Cost of damage to technical, Vocational and Youth centres.	Damages to 3 Technical Colleges, 3 Vocational Training Authority Centres, 5 National Youth Co-operative Centres and 1 National Youth Services Council Centres.	14.6	0	14.6
Loss due to disruption in service delivery / Production of goods and services				
Cost of cleaning up/ debris removal	All 336 affected schools had to be cleaned up removing the debris, mud and silts collected at the school premises.	20	5	25
Cost of repairs to schools being used as IDP camps	49 schools were used as IDP camps during the first two weeks of the flooding and hence needed minor repairs to make it ready to begin normal school activities.	58.8	0	58.8
Cost of erecting Temporary Learning Centres at schools	3 temporary learning centres were erected in 3 schools in the Ratnapura district	4.5	0	4.5
Cost of uniform, text books and stationary and other materials delivered to affected students.	Ministry of Education took immediate measures to replace lost uniform, text books and stationery for students in affected schools	88.8	10.3	99.1
Loss due to Increasing risk and vulnerability				
Cost connected with prevention of water borne diseases such as the dengue and diarrhoea through cleaning the schools environment	Cleaning up drainage system, schools' grounds and repairs to WASH facilities	25.2	0	25.2
TOTAL		**1245.2**	**172.6**	**1417.8**

Damages	1245.2
Losses	172.6
TOTAL	**1417.8**

TABLE 17: PROPORTION OF DAMAGED SCHOOLS BY DISTRICT

District	Total number of schools	Total number of damaged schools	%
Kalutara	417	136	33.0
Ratnapura	592	94	16.0
Matara	364	71	20.0
Hambantota	319	18	6.0
Galle	430	17	4.0
Total	2,122	336	

tion structures except for one Zonal Education Office.

Increased risks and vulnerabilities

Prior to the disaster, the NBRO had declared that many schools in Kalutara and Ratnapura districts are located in high landslide-risk areas and were in need of urgent relocation. Therefore, NBRO suggested that these schools should not continue providing 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 alternate and safe land areas, and resources for school construction, many children continue to attend these schools despite the risks involved.

In addition, students of the 47 schools used as temporary shelters, 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 affected districts are housed in temporary camps with support from the Government and humanitarian agencies, thereby avoiding any disruption to schooling and education services.

2.4. IMPACT ANALYSIS ON DEVELOPMENT GOALS

Children have been affected in different ways by the floods and landslides in each district. The disaster has caused a loss of life or injuries, and has left many families in extremely difficult situations with inadequate or a complete lack of shelter, limited livelihood opportunities, and disrupted schooling. For most children living in such conditions, returning to school provides the only semblance of normalcy in their lives. However, while some were able to return to schools which were not or only partially damaged, many others could not, particularly in cases where the school was significantly damaged or used to house displaced persons. This meant a significant disruption to the children's education, and for many, having to attend another school in the area. At a time when children have suffered so many losses, a new and unfamiliar environment is an added source of stress. Most affected children lost schooling and resource materials, including their notes, as well as their uniforms and shoes, which resulted in many children not being sent to school even in cases where they could return. Children living in displacement centres have the added difficulty of lack of privacy and space to study or do homework, as well as transportation difficulties in accessing the school. The effects of these challenges will be felt strongly by those who sit for GCE A/L and O/L examinations in 2017.

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 were living in, while facing an uncertain future.

2.5. CROSS-CUTTING ISSUES

According to some officers in the floods affected areas, there was a Disaster Risk Reduction (DRR) plan after the 2004 Tsunami, active for a few years, which became inactive later. The affected people have reported that they did not receive any information on the heavy rainfall experienced in the night before the floods, as well as no early warning regarding the impending floods. Even though an early warning for the landslide had been issued to cover the entire Rathnapura district, people were not able to assess the level of risk due to the landslide affecting their own village. In a few cases, due to the breakdown of all types of communication, no warning could be disseminated, and or accessed in vulnerable areas.

It is also evident that a majority of the affected schools located in flood-prone areas did not have or were unable to take part in, and implement school-safety plans as part of their DRR strategies to minimise the damage and loss caused by recurrent flooding. School safety planning em-

powers the school community, particularly the students, to be actively engaged in discussions around disaster risks and mitigation measures, as well on as how to stay safe, in their school, as well as 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 DRR discussions had not taken place in their schools or community.

The disaster could impact 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 incurred on education. Due to high cost being borne by families as a result of the disaster, children, particularly girls, from lower income quintiles, could drop out of schools to support their families by taking up alternative livelihoods. It is, therefore, recommended that school enrolment rates be monitored in districts that have been affected by the disaster, including the Estate sector. Additional measures, such as alternative livelihoods for parents and school feeding programmes can be effective in lowering the rate of school drops outs. In addition, mothers living in transitional camps reported difficulties in 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 related risks and many mothers expressed these concerns, particularly for their young daughters. Some women also reported that inadequate toilet facilities for displaced women and girls had caused serious threat to their safety as they had to go to forest areas to relieve themselves in the dark because they didn't want to be seen.

Education is generally not prioritized during disaster response and reconstruction, due to lack of data (sex, age and ability disaggregated data) on damages caused by floods and landslides on the sector, particularly, data regarding the number of school children who were affected (deaths, injuries, loss of family member or house, loss of education material, etc.) and their needs. Access to information on age, sex and ability disaggregated related data in the initial phase of the disaster enables the relevant stakeholders to mobilize resources and provide relief assistance based on the actual needs. One major reason for limited humanitarian funds allocated by international and national donor agencies to the education sector has been lack of reliable data in the initial phase when decisions for said donations were made.

2.6. RECOVERY NEEDS AND STRATEGIES

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 multi-hazards' perspective. The estimation of needs covers the entire sector, and includes the needs of the private sector as well. It is estimated that the education sector's recovery plan will require LKR 1,515.65 million to implement the planned activities in the short-, medium- and long-term basis, as explained below. (Table 18)

2.7. IMPLEMENTATION STRATEGY FOR RECOVERY

Short-term needs (for the remainder of 2017)

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

TABLE 18: RECOVERY NEEDS WITH COSTS AND TIMELINE

Recovery needs	Assumption /Comments	Costs (LKR million)		
		Short term	Medium term	Long term
Infrastructure and assets recovery				
Resumption of education services	Authorities prioritised the resumption of education services within a shortest possible timeframe. This has been commendable despite many challenges on the ground. Currently, all the affected children have access to their pre-schools/ schools except few students who have been admitted to nearby schools	0	0	0
Provision of uniform, textbooks and teaching-learning materials	All the affected students have been provided with necessary text books, uniform, stationery and schools bags by now. However, further gaps in provision will be fulfilled on a priority basis	15.0	0	0
Provision for lost furniture	Replacement of damaged furniture for teachers, officers and students	50.4	0	0
Repairs to damaged pre-schools and replacement of lost furniture and learning materials	Repairs to 382 damaged pre-schools and replacement of lost furniture and learning materials.	33.95	0	0
Devise a mechanism to closely follow up on school dropout	Devise a mechanism to closely follow up on school dropout and make sure to reintegrate them into school system	5	0	0
Provision for lost equipment.	Replacement of damaged equipment and learning materials and equipment for Computer and Science labs, Home science units, Aesthetic rooms, Sports unit and Audio video units.	0	258.1	0
Reconstruction of partially damaged school buildings.	Repairs to 336 partially damaged schools.	0	362.0	0
Construction of schools recommended for relocation and fully damaged schools.	Construction of 66 new school buildings, subject to Government policy decision. (4 schools need relocation, 62 fully damaged schools need reconstruction)	0	660.0	0
Repairs to damaged Technical, vocational and Youth service centres	Repairs to 1 Technical College, 3 Vocational Training Authority Centres, 5 National Youth Co-operative Centres and 1 National Youth Services Council Centre	0	24.5	0
Provide psychosocial support to affected students and families.	Teachers and school Development Committee/pre-school management committee members will be trained on best practice in psychosocial support for affected children and their parents; an action plan drawn and implemented at 336 schools and 382 affected pre-schools.	21.1	1.4	1.4
Review of existing curriculum and textbooks with DRR and resilience perspective.	A local consultant will be engaged to review and make recommendations.	0	0	2.4
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	0	0	9.5
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.	0	0	8.6
Improving existing policies, guidelines and systems for better safety and DRR preparedness in schools.	An International consultancy will be sought to review existing schools safety guidelines and provide recommendation to conform to international standards.	0	0	2.6
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 DMC and NBRO will be sought for technical support to undertake vulnerability mapping for all schools.	0	0	57.3
Develop an information management system at MOE along with a national data base to track damages and loss in case of an emergency	To establish an information management system (data collection, analysis, dissemination and usage) on school vulnerabilities. Data collections tools along with roles and responsibility for emergency focal points and a reporting mechanism will be established.	0	0	2.4
TOTAL		**125.45**	**1306**	**84.2**
GRAND TOTAL				**1515.65**

Both in pre-schools and Government schools (both Primary and Secondary), 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, including children with disability and learning difficulties, as well as ensuring temporary solutions to continue education in nearby schools in cases where school buildings have been heavily damaged. Adequate precaution needs to be taken to ensure that the new schools are within easy access to all students with special attention on the routes, away from potential threats, especially the risk of gender-based violence (GBV).

- *Provision of uniforms, textbooks and teaching-learning materials* based on a survey of affected schools identifying gaps in this area, including children with disabilities and learning difficulties.

- *Provision for lost furniture* to replace damaged furniture for teachers, officers and students.

- *Repairs to damaged pre-schools, and replacement of lost furniture and learning materials* in 382 damaged pre-schools with specific focus on children with disabilities and learning difficulties.

- *Provision for psychosocial support to affected children and their families* in schools and at the community level to help them cope with the stressful situation and to equip them with the skills they need to be resilient, so that they can begin rebuilding their lives, with specific focus on children with disabilities and learning difficulties.

Medium-term needs, 2018 (1 year)

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.

- *Devise a mechanism to closely follow up on school dropouts* due to the recent disaster, and make sure to reintegrate them into school system.

- *Provision for replacement of lost equipment and learning materials* for computer and science labs, home science units, aesthetic rooms, sports units, audio video units with sufficient consideration for children with disabilities and learning difficulties.

- *Reconstruction of 336 partially-damaged school buildings* after assessing the needs of relevant school buildings, including safety and DRR features, and replacing lost assets with special consideration on the needs of children with disabilities and learning difficulties, and ensuring separate, secure, hygienic and private washroom facilities for boys and girls.

- *Construction of schools previously recommended for relocation as well as fully damaged schools* in 66 units using principles of 'Building Back Better', including disaster resilience technology, better learning environment, and quality services with special consideration on the needs of children with disabilities and learning difficulties, along with ensuring separate, secure, hygienic and private washroom facilities for boys and girls.

- *Repairs to technical, vocational and youth service centres* with special provision for disabled persons.

- *Provide continuous provision for psychosocial support to affected children and their families* in

schools and at the community level to help them cope with the stressful situation and equip them with the skills they need to be resilient, and to start rebuilding their lives. Create awareness and build the capacity of the students within the already-affected schools regarding possible threats to their lives and also help build their preparedness capacity.

Long-term needs, 2019-2020 (2 years)

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 needed to be put in place to carry out the multi-hazard preparedness of education institutions, along with investing in making buildings resilient to different types of disasters. In the long term, all education institutions need to be built on the principle of 'Build Back Better' in-line with the best international practices of school safety.

- *Review of existing curriculum and textbooks with DRR and resilience perspective* overseen by a local consultant. Building of a culture of resilience in the education sector, including the incorporation of Disaster Risk Reduction and resilience into curricula in primary education, pre-school education, and teacher-training modules.

- *Promote DRR related outdoor action oriented project work* for primary, secondary and A/L students.

- *Strengthening of disaster preparedness and response processes at the schools* (both pre-schools and Government schools) and at the community level through school/community-based Disaster Risk Management (DRM) training and planning. Schools to be encouraged to develop emergency response plans.

- *Improvement of existing policies, guidelines and systems* for better safety and DRR in pre-schools and Government schools.

- *Undertake school vulnerability mapping for all types of hazards* and develop a central data base or link it with existing EMIS system.

- *Develop an emergency response and preparedness mechanism* at MOE along with a national database to track vital data on the impact of disasters on students, damages, and loss in case of an emergency.

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

In the recovery strategy, special attention will have to be paid to assisting the children with disabilities and learning difficulties, who have been affected by the disasters. In all construction-related work, either in repairs to partly-damaged school buildings and in the reconstruction of new school buildings in cases of fully damaged, or schools that are recommended for relocation due to their presence in high-risk locations, focus should be on the fact that they need to be made disabled friendly. Special learning equipment for disabled children must be considered when replacing lost equipment in schools with damaged infrastructure. Community-based rehabilitation approaches should take precedence when planning and implementing activities for children with disability and learning difficulties. Separate WASH facilities need to be constructed considering the needs of boys and girls separately. Adequate precaution should be taken to ensure that the new schools are within easy access to all students, with special attention on the routes, away from potential threats, especially the risk of gender-based violence (GBV).

The MOE, NGOs and the private sector have already provided immediate assistance to affected

schools and students by providing text books, stationary items, uniforms, and school bags, to ensure 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. UNICEF had been supporting the MOE and relevant stakeholders during the past decade in promoting participatory school self-assessment and planning processes with emphasis on the Child-Friendly Approach, including DRR and Social Cohesion. UNICEF continues to advocate for DRR, using a child-centred approach where children's interests and rights are given high priority, and children are recognized as change agents, rather than mere victims of disasters. UNICEF, along with other key stakeholder agencies, has provided technical and financial assistance to the Ministry of Education in mainstreaming DRR knowledge as a mandatory subject in the secondary school curriculum in line with the Sri Lanka Comprehensive Disaster Management Programme (SL-CDMP), and continues to build capacities on school safety and DRR planning.

In addition, UNICEF, along with other key stakeholder agencies, with financial assistance from donor agencies such as the Australian Department of Foreign Affairs and Trade (DFAT) and the Royal Government of Norway, is supporting the MOE in order to ensure that children affected in the focal districts have access to pre-schools, and primary and secondary learning opportunities, by supporting the repair/renovation of damaged schools, including replacement of damaged furniture, equipment, and water and sanitation facilities. It has also offered support to catch-up education programmes to enable children to return to, and stay in school, as well as in matters of capacity building on child-centred DRR, along with the preparation of school safety plans for disaster-affected schools. Further, UNICEF and other key stakeholder agencies, in collaboration with the Ministry of Women and Child Affairs, is supporting affected pre-schools to recover through the replacement of damaged furniture, equipment and play material and books. It is also helping in the capacity building of caregivers and the health staff, on early childhood care and development for children under the age of five. 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 disaster-prone districts.

2.8. ASSESSMENT METHODOLOGY

The data for this survey has been collected by the UOC research assistants from MOE and the relevant provinces using data collection tools developed by the Ministry of Disaster Management. Additional information has also been collected by respective UNICEF officers from the districts to complement the data collected by the volunteers. The data was tabulated and analysed by the Education Specialist, UNICEF, for the report. ■

3. Health

3.1. EXECUTIVE SUMMARY

With the start of the South-western monsoons, floods and landslides affected fifteen districts in Sri Lanka. A total of 879,778 people from 229,235 families were affected by these conditions. The total number of deaths was 219, while 154 people were injured. The number of missing people stands at 74 — as per the reports of the National Disaster Relief Service Centre.

While health sector had to respond to the health-related needs of the affected communities, emphasis was given to assessing the damage to the health-related/ medical institutions in the affected areas, losses incurred during the period of response, and needs for the recovery, including rehabilitation and reconstruction. The total impact on the health sector has been estimated to stand at LKR 349.46 million, including damages to infrastructure, equipment and furniture in 65 health institutes, as well as losses related to additional expenditure for emergency response and medical supply in 92 health institutes. The recovery-related needs include the rehabilitation, reconstruction and, in some cases, the relocation of the health institutes. The improvement of the capacities to deal with future events has been considered as well. In total, the recovery-related needs sum up a total budget of LKR 961.85 million.

3.2. PRE-DISASTER CONTEXT AND BASELINE

Curative health institutions

Sri Lanka has a widely distributed hospital network, structured based on the level of specialization. Specialized care is provided through Base, District General, Provincial General, and Teaching, hospitals, and some selected specialized hospitals. Non-specialist hospitals are the Divisional Hospitals and Primary Medical Care units. These are served by non-specialist medical officers, with occasional outreach clinics conducted by specialists from nearby larger hospitals.

Preventive health services

Community health services are organized into health units called Medical Officer of Health (MOH) areas. They coincide geographically with divisional secretariat areas. There are 341 MOH areas in Sri Lanka, and each is headed by a Medical Officer responsible for a defined population. The MOH is supported by field public health staff. The average population for a MOH is approximately 60,000. Each member of the health staff (Public Health Nursing Sister, Public Health Inspector, Supervising Public Health Midwife, and Public Health Midwife) is also responsible for a sub-divided area and its respective population. The overall responsibility for the management of community health services lies with the Provincial Health Authorities.

The pre-disaster status information of the health sector was obtained from the latest Annual Health Bulletin data, as well as from direct communication with respective Regional Directors of Health Services areas. The Ministry of Health, Nutrition and Indigenous Medicine leads the stewardship of health service development and delivery. Its main function is formulating public health policy and regulating services for both the public and private sector. It is also responsible for directly managing several large specialized services — National Hospital of Sri Lanka, Teaching Hospitals, Specialized Hospitals, Provincial General Hospitals and selected District General Hospitals. The rest of the government services in the allopathic system is managed by the decentralized system, i.e. nine provincial health authorities.

Pre-disaster health indicators

Crude Birth Rate, Crude Death Rate, Maternal Mortality Rate, Infant Mortality Rate, and

TABLE 19: PRE- DISASTER HEALTH INDICATORS

SOURCE: MINISTRY OF HEALTH

District	Crude Birth Rate (CBR)		Crude Death Rate (CDR)		Material Mortality Rate, 2013 Per 100,000 Live Births*	Infant Mortality Rate 2013*	Neo- Natal Mortality Rate	
	2014*	2015*	2014*	2015*			2012*	2013*
	Per 1,000 population					Per 1,000 Live Births		
Colombo	15.4	14.4	6.8	7.0	12.5	13.6	9.7	8.0
Gampaha	13.7	13.1	6.0	6.2	11.3	5.9	4.7	4.6
Kalutara	14.8	14.2	6.5	6.8	12.0	4.9	4.2	4.0
Kandy	18.8	17.5	7.2	7.0	58.3	12.8	9.9	9.2
Matale	19.1	17.4	6.5	6.4	19.7	8.0	4.7	6.2
Nuwaraeliya	17.5	16.5	6.3	6.3	26.3	8.4	5.9	5.9
Galle	16.7	16.4	7.3	7.6	10.2	6.9	5.0	4.6
Matara	15.2	14.2	6.3	6.6	23.6	5.0	3.7	3.4
Hambantota	20.9	19.7	5.4	5.6	28.4	3.1	3.6	2.3
Jaffna	14.9	13.6	7.1	6.9	30.4	14.0	11.3	11.3
Kilinochchi	19.1	16.9	2.9	3.1	-	7.2	0.4	4.8
Mannar	15.4	18.1	3.7	3.8	57.5	3.4	-	1.7
Vavuniya	19.6	17.6	4.9	4.7	24.1	3.6	3.5	2.9
Mullativu	11.6	12.2	4.2	3.8	-	16.3	-	9.6
Batticaloa	18.1	17.3	4.8	4.9	76.2	12.0	14.3	9.2
Ampara	21.1	20.5	4.6	4.7	14.2	2.0	1.1	1.1
Trincomalee	22.1	20.5	4.1	4.4	-	1.9	-	0.9
Kurunegala	16.0	15.4	6.6	6.7	31.8	12.3	5.3	10.2
Puttalam	199.2	18.4	5.4	5.5	32.5	3.5	5.1	2.4
Anuradhapura	17.8	17.3	5.5	5.8	53.9	7.4	8.4	4.8
Polonnaruwa	17.7	16.9	5.5	5.2	53.2	8.5	1.6	6.0
Badulla	18.4	16.2	6.4	6.1	35.8	7.2	5.3	5.5
Monaragala	19.5	18.4	4.7	4.8	27.8	3.0	3.0	1.6
Ratnapura	18.0	16.7	6.1	6.1	19.7	4.3	3.8	3.2
Kegallle	16.0	14.9	6.9	6.9	19.5	5.7	3.0	4.6
Sri Lanaka	**16.9**	**16.0**	**6.2**	**6.3**	**26.8**	**8.2**	**6.1**	**5.8**

Neo-Natal Mortality rate provide an overview of the pre-disaster information related to the health sector of Sri Lanka. The following table depicts the above-mentioned indicators of the flood– and landslide-affected districts in the backdrop of other districts, and the country as a whole. (Table 19)

3.3. POST-DISASTER EFFECTS

In May 2017, with the emergency situation at hand, health was one of the sectors that were affected both 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 Lankan Army Medical Services coordinated with the MOH in training the health staff and allocating medical supplies to provide lifesaving medical care to the survivors in the field, especially in the hard-to-reach areas.

Since health services were provided for free to the patients, and it was not possible to calculate the loss incurred due to the disruption of services. However, data on the additional expenses incurred by the health sector during flood-related response was gathered from the Disaster Preparedness and Response Division, Regional Directors of Health Services, and Medical Supplies Division. Expenses incurred by the Tri Forces were obtained from the Armed Forces.

Damages to health sector due to floods and landslides

A total of 65 healthcare institutions of the Ministry of Health and Nutrition and Indigenous Medicine were partially- and fully-affected in four districts, namely Kaluthara, Rathnapura, Galle and Mathara. The institutions included District Hospital, District Hospital type B, District Hospital type C, Base Hospitals, Maternal and Children Health Clinics, Public Health Midwife quarters, Public Health Inspector quarters and the Medical office of Health Centres. Further, significant infrastructural damage was identified in some of these institutes and some institutes were located in high-risk areas.

When the damages of assets were considered, the highest damage was reported in Rathnapura district and there was no damage reported in Hambantota district. Some health institutions were not directly affected, but required to be relocated to provisional facilities. The relocation needs to be further considered in coordination with NBRO. (Table 20)

Losses to the health sector due to floods and landslides

As mentioned above, losses due to the interruption of health-related services were not calculated since health services are provided free of charge to patients by governmental health services. Hence, losses in the health sector were essentially the additional expenses incurred during flood- and landslide-related response.

The losses were categorized into three types:

1. Expenses for provision of emergency health response activities by the Ministry of Health As the extent of the emergency was realized, cash transfers were made to the affected Regional Director of Health Services' areas for the provision of emergency health-related responses. These expenses included logistical support for deployment of emergency medical teams, health promotional activities at temporary shelters, and vector control-related activities.

2. Expenses for medical supplies Emergency medical supplies were dispatched from the Regional Medical Supplies Division network of the Ministry of Health, Nutrition and Indigenous Medicine, under the leadership of the Medical Supplies Division.

3. Expenses for the provision of emergency health responses activities by the tri-forces Summary table of Damages and Losses of Health Sector. (Table 21)

TABLE 20: DAMAGES IN HEALTH SECTOR DISTRICT-WISE
SOURCE: MINISTRY OF HEALTH

District-Wise Damages DH		Units										Total	LKR (Mn)
		DH	DHB	DHC	BH	PMCU	MCH	PHM	PHC	MOH	PHI		
Rathnapura	Building	2		5						1		8	2.7
	Other					2			1			3	60
Total		2		5		2			1	1		11	62.7
Kalutara	Building	1					9					18	22
	Equipment/ Furniture						1					1	1
Total		**1**	**0**	**0**			**9**	**0**	**0**		**0**	**10**	**23**
Galle	Building	1				1	12	5			2	0	
	Equipment/ Furniture		1			1	13	6			2	34	33
Total		**1**	**1**	**0**		**1**	**13**	**6**	**0**	**0**	**2**	**24**	**33**
Matara	Building	4			1	7	2	1				12	19.9
	Equipment/ Furniture					1	1					2	0.18
	Other				1	3	1			1		6	8.85
Total		4	0	0	2	8	4	1	0	1		20	28.93
Grand Total		**8**	**1**	**5**	**2**	**11**	**26**	**7**	**1**	**2**	**2**	**65**	**147.63**

3.4. IMPACT ANALYSIS ON DEVELOPMENT GOALS

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

3.5. 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.

3.6. RECOVERY NEEDS AND STRATEGIES

The post-disaster recovery needs of the health sector included needs for rehabilitation and needs for reconstruction. It is important to

FIGURE 9: FLOOD AFFECTED MOH AREAS
SOURCE: MINISTRY OF HEALTH

FIGURE 10: FLOOD AFFECTED HEALTH INSTITUTES
SOURCE: MINISTRY OF HEALTH

TABLE 21: DAMAGES AND LOSSES IN HEALTH SECTOR
SOURCE: MINISTRY OF HEALTH

Total Summary		
Damage	**Units**	**LKR Mn**
Building	38	44.6
Equipment/ Furniture	37	34.18
Other	9	68.85
	Subtotal Damages	**147.63**
Losses	**92**	
Additional expenses for medical supply and response of the MOH		194.18
Additional expenses for emergency response – Tri-forces		7.65
	Subtotal losses	**201.83**
	Total	**349.46**

TABLE 22: RECOVERY NEEDS DISTRICT- WISE
SOURCE: MINISTRY OF HEALTH

District	Needs	Units							Total	LKR (Mn)
		DH	DHB	DHC	MCH	PHM	PHC	MOH	Other		
Rathnapura	Relocation	2			1					3	222
	Restoration (INFR.)	1					2			3	35
	Equipment/furniture	1	1	5	5	4	7		4	27	126.3
Total											383.3
Galle	Relocation				2				2	4	29
	Restoration (INFR.)	1	1						1	3	9
	Equipment/furniture	3	1		14	2		20	4	44	148
Total											186
Kalutara	Relocation										
	Restoration (INFR.)	1			8					9	21
	Equipment/furniture				11					11	10
Total											31
Matara	Relocation				1			1		2	4
	Restoration (INFR.)	3							7	10	15
	Equipment/furniture	1			1				2	4	13.3
	Improvement for DRR								4	4	7.7
Total											40
Grand Total											640.3

TABLE 23: SUMMARY OF TOTAL RECOVERY NEEDS
SOURCE: MINISTRY OF HEALTH

Total Summary		
Needs	Units	LKR Mn.
Relocation	9	255
Restoration (INFR.)	25	80
Equipment/furniture	59	297.6
Improvement for DRR (Retention walls, Removal of most dangerous trees)	4	7.7
	Subtotal district wise	640.3
Additional Recommended Requirement (Life Jackets, Ambulance for disaster-prone hospitals, buildings for the disaster management team, mobile laboratory, etc.)		319
Emergency Operation Centre		2.55
	Total	961.85

TABLE 24: ESTIMATED RECOVERY NEEDS IN TIMELINE
SOURCE: MINISTRY OF HEALTH

Recovery need		Estimation LKR (Mn.)
Short term	Restoration	80
	Equipment & Furniture	297.6
	Sub-Total	377.6
Medium Term	Improvement of DRR	326.7
	Sub-Total	326.7
Long Term	Relocation	255
	Emergency Operation Center	2.55
	Sub-Total	257.55
Total		961.85

make sure that the health facilities are rehabilitated to functional status as soon as possible, so that the continuity of services is maintained. The current disaster posed unique challenges when it comes to reconstruction-related efforts. 124 health institutions need to be repaired, renovated or relocated. The damages account for the infrastructure (i.e. roofs and walls), as well as the equipment, materials, documents, and drugs' stocks.

In addition to the rehabilitation and reconstruction of damaged health facilities, some Divisional hospitals, such as Ayagama and Rassagala need to be rebuilt at safer locations, in line with the concepts of resilience elaborated in the Safe Hospitals Concept under all circumstances. A total number of 9 health institutions might require to be relocated.

In order to enhance the capacities of the overall health system during disaster risk reduction (DRR) and emergency response, the comprehensive improvement of the health institutions has been considered, inclusive of equipment and vehicles, among others. Considering the high impact experienced in Rathnapura District, the establishment of a disaster management operation centre has also been considered.

3.7. IMPLEMENTATION STRATEGY FOR RECOVERY

The Ministry of Health will implement all the recovery-related activities through the line ministry, and provincial and regional directorates of health services that are administratively responsible for the delivery of health-related service. The DPRD, being the focal unit for all emergency-related activities, will be the main focal unit during 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 Lankan Army, the Directorate of Army, Medical Services, will be the focal unit as the administrative authority. The Sri Lanka Army Medical Services will be the focal unit as the administrative authority. The Sri Lankan Army has necessary technical capability to implement their recovery-related needs.

3.8. ASSESSMENT METHODOLOGY

A data collection format was sent to each Regional Director of Health Services to obtain information about the damaged or affected health institutions. In addition, rapid assessment teams consisting of Medical Officers, specializing in Health Sector Disaster Management, were deployed to the affected health institution sites. The information gathered through the above two sources and others were triangulated before the final report was produced.

Limitations of the Damage, Loss and Needs-related assessment of the Health Sector

1) It should be noted that the costs of damages in most instances were rough estimations, done as a part of the rapid assessment. These may need to be validated by a subsequent detailed assessment, especially prior to the commencement of reconstruction-related activities.

2) The current report covers government-owned/ managed health institutions only. The damage, losses, and needs of private health institutions may need to be covered by a similar assessment.

3) The authorities lack clarity on the value of damages as per the current market rates and how it will impact the health institutions in the coming years. The reconstruction phase will adopt the principles of 'Build Back Better' to ensure resilience and safety of critical health infrastructure; however, the lack of correct assessment of damages can inflate the actual damage value.

4) The value of damage has been estimated considering the current market rates. On the other hand, recovery needs envision for the health institutions to be in the years to come, embracing the 'Build Back Better' principles. ■


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SECTOR REPORTS

4. Food Security, Agriculture, Livestock, Fisheries

4.1. EXECUTIVE SUMMARY

Sri Lanka is challenged by the appearance of recurring natural disaster events, primarily floods and droughts. The country is currently facing the double burden of the aftermath of floods, and a recurrent drought. The floods and landslides of May 2017 caused significant displacement, damage to productive assets, loss of livelihood, and reduced agricultural, livestock, and fisheries' rate of production.

The total damages from the May 2017 disasters amount to LKR 10,292.95million, while the total losses correspond to LKR 2,401.12 million. The highest damage has been reported from the harvest of tea, and the highest loss has been estimated in the cultivation of paddy.

The recovery needs are estimated at LKR 4,269.89 million. Approximately, LKR 939 million is required to address the short-term recovery needs, whilst 78 percent of the other needs identified, correspond to the medium and long terms, and add up to LKR 3330.89 million. 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 the farming of flood-resistant varieties of crops, inter-cropping and crop diversification.

4.2. PRE-DISASTER CONTEXT AND BASELINE

Agriculture

The Agriculture, Forestry and Fisheries sectors of Sri Lanka account for 7.9 percent of the total Gross Domestic Product (GDP). Additionally, according to the Central Bank's Annual Report, 2015, GDP has grown by 5.5 percent in value-added terms during 2015, compared to 4.9 percent growth in 2014.

Rice is the most important crop in terms of cultivation, and accounts for over 10 percent of the total agriculture sector. Rice cultivation occupies 34 percent (0.77 million ha) of the total cultivated area in Sri Lanka. About 1.8 million farming families are engaged in island-wide paddy cultivation. On average, 560,000 ha are cultivated during Maha (major season from Sep-March) and 310,000 ha during Yala (minor season from May-Aug), taking the average annual acreage of rice planting to about 870,000 ha. The key challenges to the rice sector are climate change-induced disasters and expanding industrialization. Therefore, to achieve production-related targets, increasing cropping intensity and national average yield, need to be considered.(Table 25)

Due to continued climate shocks, the total cultivation extent in Yala 2017 is reportedly the lowest compared to last four years' Yala cultivation.

TABLE 25: RICE PRODUCTION SUMMARY STATISTICS
SOURCE: SOCIO-ECONOMICS AND PLANNING CENTRE, DEPARTMENT OF AGRICULTURE

Paddy Production Details	Unit	Yala Season			
		2014	2015	2016	2017
Gross Extent sown	hectares'000	313	481	394	255
Production	mt ' 000	1,145	1,942	1571	988

The total production including Maha 2016/17 is sufficient to provide for only 7.6 months of the national demand for rice.

As shown in Figure 11, most of the paddy and other crops were on growing stage at the time of the floods.

Fisheries

The fisheries' sector accounts for more than 1.3 percent of the national GDP, resulting in being the highest contributor for the agricultural sector (Central Bank, 2016). With the lifting of the European Union's (EU) ban on Sri Lankan seafood exports, with effect from June 2016, the demand from the EU for Sri Lankan fish varieties expanded. Accordingly, fish exports to the EU increased significantly by 23.1 percent (2,540 metric tons) in 2016. However, continued drought in the dry zone from June 2016, and the 2017 floods have significantly impacted the inland fisheries' sector in year 2017, and the total production would have collapsed compared to year 2016. (Table 26)

Food Security

Food security is achieved when all people, at all times, have physical and economic access to sufficient, safe and nutritious food, to meet their dietary needs and food preferences. Active food availability in Sri Lanka is mainly determined by local production and import of crop, livestock and fish products. At present, 80 percent of Sri Lanka's food requirement is produced domestically and only less than 20 percent is imported. Sri Lanka is nearly self-sufficient when it comes to rice, the nation's staple diet, as well as in the local production of other main supplementary food sources such as vegetables and green leaves, pulses (except dhal and chick peas), root crops (except potato), spices, and fruits that exceed 70 percent of total availability.[32]

Sri Lanka remains at the rank of 65 out of 113 in the Global Food Security Index of 2016. Poor affordability, food quality, and safety, are key drivers when it comes to achieving a higher rank in food security. According to FAO/WFP estimates, 4.7 million people are considered to be undernourished in Sri Lanka.

Self-sufficiency rates of animal protein products in the country exceed 97 percent, particularly in fish and poultry products. Even though the food availability is acceptable, the moderate to acute malnutrition levels still remain at critical levels. However, the stunted and underweight population among children under the age of 5 has declined from 21.2 percent to 13.1 percent and 27.3 to 23.5 percent, respectively, during the period 1995/96 -2012. Low birth weight declined from 21 percent in 1993 to 18 percent in 2012. (Table 27)

* (Production + Imports) – (Change in Stocks + Exports) ** Quantities for Seed, Animal Feed, Waste, processing & Manufacturing excluded

4.3. POST-DISASTER EFFECTS

In this chapter, effects related to four sub-sectors: crop agriculture, plantation, livestock and fisheries are presented. The rapid needs-related and disaster-impact assessment conducted by the Ministry of Disaster Management has identified that approximately 70,000 flood victims were severely food insecure and required food assistance. Also, another 495,000 people were identified as part of the moderately-affected population.[33] Post-disaster recovery assistance, in particular livelihood improvement support, community-based asset creation to enhance resilience, and disaster-risk reduction activities to mitigate or minimize risks, are the most appropriate and recommended interventions among this group.

32. National Strategic Review of Food Security and Nutrition, 2017

33. http://www.dmc.gov.lk/attchments/20170602_sla%202017%20flood%20%20Rapid%20Impact%20Assessment,v02.pdf

CROP CALENDER (MAJOR CROPS)

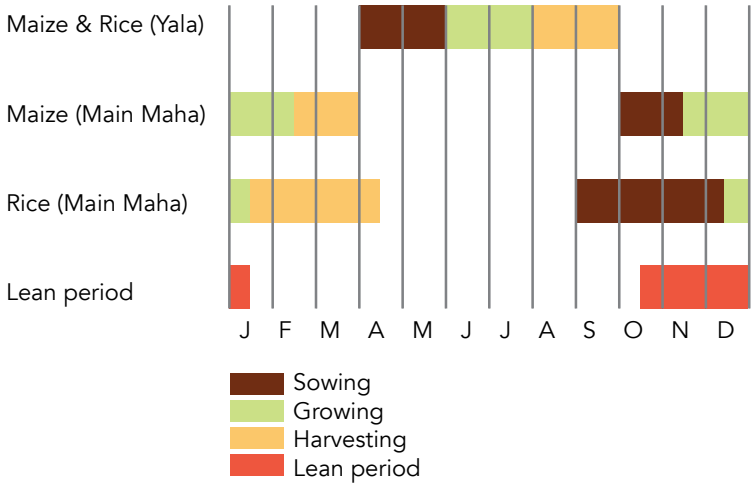

FIGURE 11: CROP CALENDAR, SRI LANKA

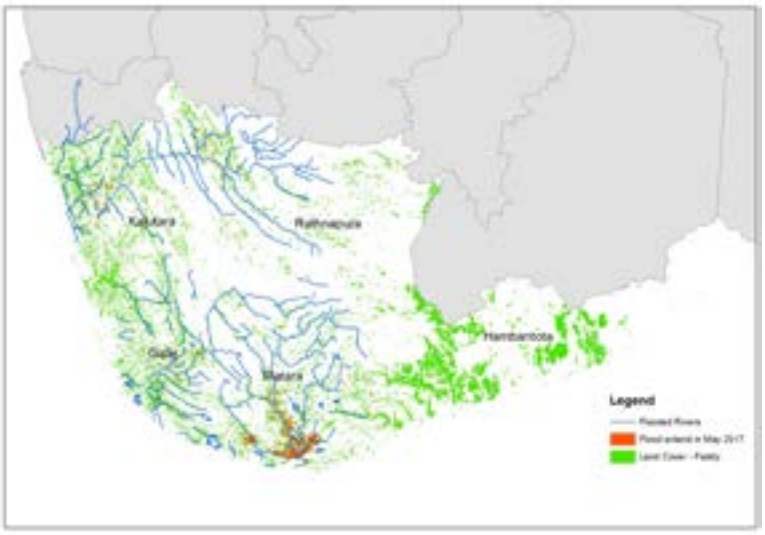

FIGURE 12: FLOOD INUNDATION AND PADDY CULTIVATION

TABLE 26: TOTAL FISHERIES PRODUCTION IN SRI LANKA
SOURCE: CENTRAL BANK OF SRI LANKA, 2015

Sub-sector	Total production (MT'000)		
	2014	2015	2016
Marine	459	453	457
Coastal and Lagoon	279	269	274
Offshore	180	184	183
Inland Fisheries	76	67	74
Capture	69	57	58
Aquaculture	2	3	9
Shrimp Farms	5	7	6

TABLE 27: FOOD BALANCE SHEET IN SRI LANKA

SOURCE: NATIONAL STRATEGIC REVIEW OF FOOD SECURITY AND NUTRITION TOWARDS ZERO HUNGER, 2017

Items Quantity ('000mt)		Production		Gross Imports		*Available Supply	**Food Net	Food (g/ day)
		% Supply	Quantity ('000mt)	% supply				
Cereals		4,835.36	90.3	522.03	9.7	5,356.79	3,477.31	469.37
Roots, Tubers & Other Starchy Food		421.87	77.4	123.2	22.6	545.07	411.61	54.93
Sugar		54.86	9.3	538.97	90.9	592.90	556.48	75.11
Pulses & Nuts		69.02	30.0	161.23	70.0	230.25	219.89	29.68
Vegetable (including Onions)		1,055.71	86.4	184.26	15.1	1,221.35	1,109.00	149.70
Soya		4.16	90.4	0.48	10.4	4.60	4.60	0.62
Fruits		609.81	94.8	62.48	9.7	643.14	631.93	85.3
Meat		162.05	98.3	2.77	1.7	164.82	164.82	22.25
Eggs		92.81	100.0	0	0.0	92.81	91.14	12.30
Fish	(i) Fresh	512.84	101.1	15.84	3.1	507.32	200.34	27.04
	(ii) Dried & Salted	68.2	64.5	37.61	35.5	105.81	105.81	14.28
	(iii) Tinned Fish	1.12	4.9	21.84	95.1	22.96	22.96	3.10
Milk	(i) Fresh	278.01	100.0	0	0.0	278.01	179.58	24.24
	(ii) Whole Dried	11.61	11.4	89.91	88.3	101.85	101.23	13.66
	(iii) Condensed	7.34	99.2	0.02	0.3	7.40	7.40	1.00
	(iv) Milk Food	10.48	99.7	0.03	0.3	10.51	10.51	1.42
Oil & Fats (including Coconut)		939.42	102.4	18.54	2.0	917.54	755.15	101.92
Total		**9,134.67**	**84.6**	**1,779.21**	**16.5**	**10,803.13**	**8,049.76**	**1,085.92**

* (Production + Imports) – (Change in Stocks + Exports) ** Quantities for Seed, Animal Feed, Waste, processing & Manufacturing excluded

TABLE 28: TOTAL DAMAGES TO AGRICULTURE, LIVESTOCK AND FISHERIES

SOURCE: MINISTRY OF AGRICULTURE, DEPARTMENT OF AGRICULTURE, DEPARTMENT OF EXPORT AGRICULTURE, MINISTRY OF RURAL ECONOMICS AFFAIRS, NATIONAL AQUACULTURE DEVELOPMENT AUTHORITY, MINISTRY OF NATIONAL POLICIES AND ECONOMIC AFFAIRS

Summary of Total Damage						
	Damaged Cost LKR.					Total
Agriculture	Hambanthota	Galle	Kalutara	Matara	Rathnapura	
Paddy	30,734,775	7,382,428	10,927,875	38,201,490	17,327,250	104,573,818
Tea	56,964,000	3,009,290,556	2,772,450,000	2,389,891,896	925,968,000	9,154,564,452
Tea Products		64,366,200	93,691,080	12,911,638	1,031,082	172,000,000
Tea Factories		184,615,385	169,230,769	30,769,231	15,384,615	400,000,000
Rubber		2,108,000			24,970,000	27,078,000
Cinnamon	1,163,160	2,505,400	18,420,804	1,444,300	5,684,035	29,217,699
Pepper	1,154,600	200,000	3,711,825	403,650	300,000	5,770,075
Areca nut	175,000	20,000	-	-	43,412	238,412
Turmeric			37,547			37,547
Ginger			11,456,250			11,456,250
Banana					3,780,000	3,780,000
Manioc					720,000	720,000
Vegetables & other field crops	8,520,000	27,071,088	47,574,319	2,371,454	33,831,712	119,368,573
Fruit		944,000		3,415,250		4,359,250
Total crops and plantation	**98,711,535**	**3,298,503,057**	**3,127,500,468**	**2,479,408,909**	**1,029,040,105**	**10,033,164,074**
Livestock	Hambanthota	Galle	Kalutara	Matara	Rathnapura	Total
Buffaloes	1,440,000	3,720,000		2,400,000	3,120,000	10,680,000
Chicken	1,312,500	100,000	300,000	1,822,500	131,000	3,666,000
Cattle	2,400,000	62,000,000	30,000,000	94,500,000	1,600,000	190,500,000
Goat	165,000	1,290,000	1,500,000	2,925,000	405,000	6,285,000
Swine			45,000,000			45,000,000
Office Equipment & Medicines	213,000	784,000		46,000		1,043,000
Total livestock	**5,530,500**	**67,894,000**	**76,800,000**	**101,693,500**	**5,256,000**	**257,174,000**
Fisheries						
Boats		14,000				14,000
Nets	2,142,500	2,100				2,144,600
Canoes (50% damaged)	129,000	107,000				236,000
Canoes destroyed	215,000					215,000
Total fisheries	**2,486,500**	**123,100**	**-**	**-**	**-**	**2,609,600**
Total Reported Damages in Five Districts						10,292,947,674

Agricultural crops

Figure 12 shows the total inundated area during the floods. All the lowland cultivations were submerged for a considerable duration during the May 2017 floods.

Plantation sector

The plantation sector recorded the largest damage, mainly due to the damages to tea plantations. Primarily, over 3,035 hectares of tea lands have been destroyed. The damages to tea factories were also reported as over LKR 400 million with largest damages in Kalutara and Galle districts. Damage to the rubber sector was also prominent in Ratnapura district (over LKR 27 million).

Most of the paddy lands affected by floods were at the initial planting and growing stages. Approximately, 5,100 ha of paddy cultivations were damaged due to the floods. The highest impact on paddy cultivation was reported in Matara district.

Livestock Sector

The livestock sector was affected mainly in Matara, Kalutara and Galle districts. The highest impact was reported in the cattle, swine, buffalo, goat, and poultry sectors. The total damages reported in the livestock sector stands at LKR 257.17 million. Out of the total, damage to office equipment and medicines has been reported to amount to LKR 1.043 million.

Fisheries Sector

Reported damage in fisheries is low, compared to the other production sectors. Mainly, loss of fishing nets, and damages to canoes were reported in Hambanthota and Galle districts.

Agricultural Labour

The agricultural sector's labour division was also affected by floods, mainly in the plantation and crop cultivation sectors. Labour opportunities in land preparation, planting, fertilizing, watering, weeding and harvesting were disturbed due the floods. The total wages' loss for the sector is estimated to be LKR 634,033,821.[34]

In the five districts, the household incomes over 33,000 agricultural labourers have been reduced due to flood and landslides. As a result of loss of livelihood opportunities, the food-security status among agricultural labourers is likely to have deteriorated. Most of the labourers had difficulty in coping with the current expenditure on food due to reduced purchasing power from limited earnings. Cash for work or short-term community-based cash interventions are necessary to be introduced until the situation becomes normal.

The estimate total effect due to the floods and landslides in May 2017 is LKR 12,694,070,550.

4.4. IMPACT ANALYSIS ON DEVELOPMENT GOALS

Sri Lanka is highly vulnerable to flood and landslide-related damages leading to physical, as well as socio-economic impact. The agriculture sector faces significant challenges from climate-related disasters as it tries to achieve sustainable development. Adapation measures needs to be introduced to mitigate floods, landslides and other climate-related disasters for reaching the goal of eradicating poverty, specifically in the farming communities.

The Government has developed a National Physical Plan, which will remain in implementation from 2011-2030, with the aim of providing a broad framework to secure Sri Lanka's place in the global economy by promoting economic growth. It is important to analyse the plan, considering its implication on the environment, and the socio-economic, and political situation of the country. The National Physical Plan proposes to establish rice-based

34. The loss in wages was estimated by a reduction in agricultural employment for 75% of the sector's active force during a period of 2 weeks, and for 25% of the active force during a period of 2 months.

TABLE 29: TOTAL LOSSES FOR AGRICULTURE, LIVESTOCK AND FISHERIES SECTORS

	Estimated Losses (LKR.)					Total Estimated Loss (LKR.)
Crop	Hambanthota	Galle	Kalutara	Matara	Rathnapura	
Paddy	315,600,000	40,300,000	64,000,000	270,700,000	137,100,000	827,700,000
Tea	1,438,200	75,977,138	60,338,855	69,997,500	23,378,400	231,130,093
Rubber		307,994	790,636		2,069,303	3,167,932
Vegetables & other field crops	17,309,910	59,592,331	100,241,436	8,096,291	18,341,124	203,581,093
Sub Total	**334,348,110**	**176,177,462**	**225,370,927**	**348,793,791**	**180,888,827**	**1,265,579,117**
Livestock						
Buffaloes	4,554,000	11,764,500		7,590,000	9,867,000	33,775,500
Chicken	2,944,150	252,500	1,262,500	4,601,813	330,775	9,391,738
Cattle	5,225,760	134,998,800	108,870,000	205,764,300	3,483,840	458,342,700
Sub total	**12,723,910**	**147,015,800**	**110,132,500**	**217,956,113**	**13,681,615**	**501,509,938**
Wage loss	**0**	**91,200,247**	**62,543,975**	**259,839,339**	**220,450,260**	**634,033,821**
Total	**347,072,020**	**414,393,509**	**398,047,402**	**826,589,243**	**415,020,702**	**2,401,122,876**

food processing industries in Hambanthota district. The damages to paddy cultivation will affect the establishment or development of these industries. Also, this Plan proposes to construct fishery harbours and fish-based food processing industries at Dickwella, Ambalangoda and Dodanduwa areas.[35] Now, as damage has been reported in the fisheries sector in Galle and Hambanthota districts, there will be a negative impact on the construction of the fishery harbours and processing industries in those areas.

Furthermore, repeated shocks to the supply chain in the plantation sector, especially in the tea sector, may create loss of marketing opportunities in the international markets, impacting the national GDP.

4.5. CROSS-CUTTING ISSUES: GENDER AND FOOD SECURITY

Over 80 of the total rural household livelihood activities are closely intertwined with agriculture and related industries, whether as producers, processors, retailers, or elsewhere in the market chain. Rural livelihoods in Sri Lanka are broadly influenced by agro-climatic and topographic features. Limited diversification of livelihoods has resulted in high sensitivity to climate-related shocks.

Although women have been increasingly employed in the plantation sector, they are still expected to shoulder the responsibility of household activities, which is perceived to be exclusively 'women's work', by both men and many women. In addition, there is high incidence of gender-based violence (GBV), with 83 percent female victims from the Estate sector.

In the agriculture sector, most of the plots are registered under the male household member's name. Women are actively involved in agricultural activities — however; they have unequal access to skills development, agricultural extension services, and markets. They are often relegated to the role of unpaid family workers, without access to independent income, and when it is paid agriculture labour, women are paid lower wages than male labourers.

The impact of flood on paddy cultivation has potential implications on food security. Paddy farmers indicated that the plots are required to be cleaned of the sand brought in by the floods in order to replant. Such a situation has negative implications on farmers, including the need for additional casual labour. For some, casual labour may be the only option to provide food for the family, before they are able to resume their own production. Therefore, any impact on the productive sector will surely have implications on livelihoods and the employment dynamics all over the country. In Matara district, the plantations lands of the small tea holders have been damaged by sand and silt, and some of them require replanting.

Furthermore, farmers from the affected areas experienced difficulties in selling their products, due to the consumer perception related to product contamination due to the disaster, i.e. in Ratnapura district.

4.6. RECOVERY NEEDS AND STRATEGIES

The total estimated recovery and reconstruction cost in the agriculture sector is LKR 4,269.89 million. LKR 939 million is required for short-term recovery interventions over the next six-month period. With the aim of improving resilience among small-scale vulnerable farmers, the recovery needs have been estimated using the 'Building Back Better' approach.

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:

35. National Physical Plan (2012), National Physical Planning Department http://www.nppd.gov.lk/index.php?option=com_

TABLE 30: RECOVERY AND RECONSTRUCTION NEEDS IN THE AGRICULTURE SECTOR (MILLION LKR)

		Short term	Medium term	Long term
		2017	2018	2019-2020
A	**Recovery**			
1	Crop input supply (paddy and other crops)	220	-	-
2	Input supply in fisheries	5	30	-
3	Input supply for livestock and poultry (30% of the affected population, considered as most vulnerable)		282.89	-
B	**Reconstruction**			
1	Replacement of agriculture inputs, tools and machineries (tea factories)	450		
2	Livelihood diversification package (for tea and spices cultivators' small holders: 2000 households for 1 year)		288	576
3	Cash for work for land preparation and debris removal and sand cleaning (from tea, paddy and rubber damaged areas): LKR. 700 per day × 40days × 1 acre)	264	728	
4	Generating skills and awareness among communities on better land use planning (GN level)		206	
5	Introduction of protected agricultural systems for crop agriculture (particularly in Hambantota and Rathnapura)		75	
6	Introduction of crop insurance to the small-scale tea sector (*annual premium 10,000LKR/ ha)			1145
	Total Needs (A+B)	**939**	**1609.89**	**1721**
	Total Needs			**4269.89**

1) Provision of inputs for crop planting, including timely provision of seed, fertilizer and planting equipment;

2) Provision of inputs for fisheries and livestock restoration, and

3) Provision of immediate compensation to small-holder producers. Assistance is particularly required by small-scale tea, rubber and spices famers.

Medium-Term Recovery Activities

In the medium term, reconstruction and rehabilitation of the Estate sector's infrastructure including rubber and tea processing centres should be a priority. Also, cash-for-work projects should be introduced for people in possession of small agricultural holdings to address household food security needs, while restoring their lands, so that it can be prepared for cultivation. Community-based resilience building activities, such as construction of flood-control bunds, improvement of watersheds and controlled run-off, livelihood diversification, and the introduction of low-risk land-use practices should be implemented.

Long-Term Recovery Activities

Promotion of agricultural insurance programmes, identifying and mapping high-risk agricultural lands, imposing of law and order on illegal constructions and high-risk land use practices, promotion of sustainable land management techniques along with adequate training, promoting climate-smart agriculture through the introduction of flood-resistant crop varieties, and increased allocations for agricultural research on reducing the effects of climate shocks, are considered to be the primary long-term risk-reduction strategies. Further considerations include building the capacity of the agriculture officers to monitor and regulate agricultural land use and maintaining additional seed storage for use in emergencies. (Table 30)

4.7. IMPLEMENTATION STRATEGY FOR RECOVERY

The Ministry of Agriculture (MoA) is recognized as the lead agency for the implementation of recovery strategies. To implement the strategies, it will work together with the Department of Animal Production and Health, and the Department of Fisheries and Aquatic Resources as corresponding institutions. These institutions will coordinate with the Ministry of Disaster Management and Ministry of Mahaweli & Environment, and the Ministry of Irrigation.

With regard 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 FAO and WFP, and other NGOs, as well as to align with SDG indicators.

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

4.8. ASSESSMENT METHODOLOGY

The assessment of damage and loss in the agriculture sector was primarily based on the information collected by the UOC research assistants from the reports of the Ministry of Agriculture, Department of Agriculture, Department of Export Agriculture, Ministry of Rural Economics Affairs, National Aquaculture Development Authority, Ministry of National Policies and Economics Affairs, and the District Secretariats of the affected districts.

The damages were estimated under each sub-sector by estimating the monetary value of the replacement costs at current market prices,

i.e. replacement cost of nursery plants meant for export, agriculture crops, fishing gears (canoes), etc.

Losses were estimated using the values of loss of harvest, cost of replantation, cost of land preparation, loss of labour wages, and diminished revenue.

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

- If the paddy cultivation was at the initial stage during the floods, it was assumed that farmers have replanted in most of the districts as per the Socio-Economic Planning Centre, Department of Agriculture. Therefore, the loss for paddy cultivations damaged at the initial stage was assumed to be zero.
- The recovery needs have been calculated using the principle of 'Building Back Smarter' (BBS) and the BBB (Building Back Better) principles.
- Two assumptions were made when losses were estimated in the livestock sector
- Out of the total deaths reported under poultry were divided as 50% layers and 50% broilers
- Out of total deaths of cattle and buffalo, 60% were considered as cows.
- No data was reported related to the impact on current products including tea leaves, processed rubber, etc. ■


ECO
Airtel

5. Industry and Commerce

5.1. 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 25, 2017 onwards, and to provide estimates of the recovery and reconstruction needs. 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. The information was collected for three major economic sectors under industry and commerce, which are industry and construction, trade, and services. (Table 31)

The damages and losses of the industry and commerce sector in both formal and informal sectors in all five mostly-affected districts of the country have been assessed to be LKR 4.97 billion. Out of the total damages and losses incurred in the May 2017 disasters, 60 percent is accounted for by theformal sector, of which 74 percent corresponds to damage claims from insurance providers, which amounts to LKR 1.93 billion (as at July 15, 2017). This assessment comprises damages and losses only to industries owned by the private sector. State-owned enterprises were not covered in this assessment due to unavailability of damage and loss data from those enterprises, at the time of the assessment.

The informal sector was badly hit by the disaster, especially in terms of flood-related damages and losses in the five priority districts, accounting for LKR 1.94 billion of which Matara and Galle districts account for LKR 1 billion. Even though the informal sector represents only 40 percent of the total estimated damage and losses in the Industry and Service sector, in terms of impact on livelihood and employment, the post-disaster effects are significantly high in this sector.

The lack of a proper mechanism to collect damage and loss data, and the unavailability of business continuity plans, have been identified as the key issues in this sector's assessment, though these recommendations had already been provided in the 2016 PDNA report. Also, it is important to identify hazard-prone areas and establishments exposed to different risks. The sector's cost of recovery will largely be absorbed by the insurance companies and NITF, but in terms of strengthening the post-disaster information management system, promoting disaster-risk preparedness, risk reduction, and business-continuity planning in the private sector, an additional estimated cost of LKR 41 million will be required for the sector's recovery.

5.2. PRE-DISASTER CONTEXT AND BASELINE

Similar to May 2016 floods and landslide disasters, in May 2017, torrential rains caused widespread damages and losses in a number of districts of the country. Of the total estimated damages and losses caused by the May 2016 disasters (i.e. over LKR 99 Billion), over 31 percent was reported in the Industry and Commerce

TABLE 31: SUMMARY OF DAMAGE, LOSSES AND RECOVERY NEEDS OF THE INDUSTRY AND COMMERCE SECTOR

Sector	Damages	Losses	Recovery Needs
Informal sector	692,514,151	1,247,712,333	41,000,000
Formal sector	1,927,799,731	977,505,733	
Total	**2,620,313,882**	**2,225,218,067**	**41,000,000**

sector. Since the biggest losses were reported from large industries, the disaster showed lack of preparedness in the private sector, otherwise considered to be the most efficient sector in the economy, and also known for their proactive measures for risk aversion. The Post Disaster Needs Assessment (PDNA) report of 2016, conducted despite a number of challenges, including lack of data on the Industry and Commerce sector, proposed four distinct recommendations to reduce the disaster risks of the sector, and also to improve the data management capability of the sector. Those were:

1) Establish a monitoring mechanism to collect information in the Industry and Trade sector.

2) Establish Zoning and enforce existing laws.

3) Establish/monitor Business Continuity Planning.

4) Ensure insuring of assets in flood prone areas.

The impact of May 2017 flood and landslides was very similar to the May 2016 disaster, except for the geographical areas that were most affected. It has once again reiterated the importance of the above-mentioned recommendations, and also highlighted the lack of attention to the recommendations put forth by the PDNA in 2016. The main geographical focus of the May 2016 disaster was on urban industrial hub, the May 2017 disaster concentrated more on Sri Lanka's rural landscape, wherein also a significant number of industries and services were exposed, especially to floods in these areas. According to the Department of Census and Statistics (2014), 24 percent of all industries and 23 percent of all trades in the country (including services) are located in the five most affected districts of the May 2017 disasters (i.e. Kalutara, Ratnapura, Galle, Matara, and Hambantota).

Business establishments are broadly categorized into formal and informal sectors. The Department of Census and Statistics defines the Informal sector based on the registration status, accounts' keeping practices, and total number of regular employees employed in the business. If the entity is not registered in the Employment Provident Fund / Department of Inland Revenue, or does not keep formal accounts, or the number of regular employees is less than 3-4, then such entity is considered as part of the informal sector. Therefore, usually micro enterprises are considered to be part of the informal sector. However, according to the Ministry of Industry & Commerce, micro businesses are enterprises with less than 10 employees. The formal sector comprises of small, medium and large enterprises. This assessment uses the criterion used by the Department of Census and Statistics. (Table 32)

According to the Department of Census and Statistics (DCS), out of the 229,572 business establishments (both formal and informal) located in the five most-affected districts, an overwhelming majority of 93% (equivalent to 215,139 establishments) is located within the affected Divisional Secretariat divisions of these districts. Out of selected five districts, the number of affected Divisional Secretariat divisions was as follows: 19 at Galle, 16 at Matara, 12 at Hambanthota, 17 at Rathnapura, and 14 at Kalutara.

Out of total 215,139 businesses in the affected DS divisions, only 2 percent fall under the formal sector. 98 percent are informal establishments. Retail shops are the most commonly in business formal enterprises in the affected DS divisions, followed by financial institutions, and manufacturing units of food products. In the informal sector, over 36 percent of all establishments are retail trades. Food and garment producers are also common in the informal sector, in the affected division. In the informal sector, median asset value is around LKR 0.2 million, and in the formal sector it ranges from

TABLE 32: FORMAL AND INFORMAL ENTERPRISES CLASSIFICATION USED FOR THIS ASSESSMENT (BASED ON DEPARTMENT OF CENSUS & STATISTICS)

Major Economic Sector	Groups		Criteria (Number of Persons Engaged)
Industry and Construction	Informal	Micro	1 to 4
	Formal	Small	5 to 24
		Medium	25 to 199
		Large	200 and above
Trade	Informal	Micro	1 to 3
	Formal	Small	4 to 14
		Medium	15 to 34
		Large	35 and above
Services	Informal	Micro	1 to 4
	Formal	Small	5 to 15
		Medium	16 to 74
		Large	75 and above

LKR 1.3 million to LKR 120.7 million. (Table 33, 34)

The economically active population in Sri Lanka was estimated to be over 8.9 million (Sri Lanka LFS Annual Report, 2015), representing 62.7 percent male (5.4 million) and 37.3 percent female (3.2 million). However, as many women are self-employed in the informal sector and working at home, this reality is not adequately reported in formal statistics.

At country level, labour force is highly concentrated in the services sector (45%) and industry (28%). The remaining 27% corresponds to the agriculture sector, which is decreasing as urban population raises. In the most affected districts by the flood and landslides in May 2017, the distribution of employment within the main sectors is shown in Table 35. The concentration in services activities is particularly relevant in Kalutara and Galle. Kalutara also presents a high proportion of employed population occupied in industrial activities.

TABLE 33: NUMBER OF ESTABLISHED INFORMAL ENTERPRISES IN AFFECTED FIVE DISTRICTS AND MEDIAN ASSET VALUE

District	Micro		Ind & Cons.		Trade		Services		Total	
	Num of Estab.	Median (LKR. '00,000)	Num of Estab.	Median (LKR. '00,000)	Num of Estab.	Median (LKR. '00,000)	Num of Estab.	Median (LKR. '00,000)	Num of Estab.	Median (LKR. '00,000)
Kalutara	55965	2	13540	2	23554	2	18871	2	55965	2
Galle	44445	2	10808	2	18907	2	14730	2	44445	2
Matara	40030	2	12542	2	15133	2	12355	2	40030	2
Hmbantota	29587	2	11170	2	10696	2	7721	2	29587	2
Ratnapura	40855	2	9299	2	18894	2	12662	2	40855	2
Total	210882	2	57359	2	87184	2	66339	2	210882	2

TABLE 34: NUMBER OF ESTABLISHED FORMAL ENTERPRISES IN AFFECTED FIVE DISTRICTS AND MEDIAN ASSET VALUE

District	SMEs								MS							
	Small		Medium		Large		Total		Ind & Cons.		Trade		Services		Total	
	Num of Estab.	Median (LKR. '00,000)	Num of Estab.	Median (LKR. '00,000)	Num of Estab.	Median (LKR. '00,000)	Num of Estab.	Median (LKR. '00,000)	Num of Estab.	Median (LKR. '00,000)	Num of Estab.	Median (LKR. '00,000)	Num of Estab.	Median (LKR. '00,000)	Num of Estab.	Median (LKR. '00,000)
Kalutara	633	30	458	105	116	1061	1207	55	562	100	247	60	398	20	1207	55
Galle	499	28	383	100	82	811	964	55	330	140	237	53	397	20	964	55
Matara	387	50	269	110	48	354	704	75	239	114	183	90	282	40	704	75
Hambantota	269	30	116	76	27	864	412	44	123	150	79	63	210	18	412	44
Ratnapura	584	13	325	107	61	502	970	35	500	35	200	60	270	15	970	35
Total	2372	29	1551	102	334	656	4257	53	1754	100	946	63	1557	21	4257	53

TABLE 35: PERCENTAGE DISTRIBUTION OF EMPLOYED POPULATION (2016) BY MAJOR INDUSTRY GROUP IN AFFECTED DISTRICTS

District	Agriculture	Industry	Service
Kalutara	15.8	31.1	53.0
Galle	34.6	24.0	41.4
Matara	37.4	23.3	39.4
Hambantota	36.6	26.2	37.2
Ratnapura	37.2	27.5	35.4

5.3. POST-DISASTER EFFECTS

Similar to the 2016 disasters, a full picture of the damages and losses incurred by the Industry and Commerce sector is not available, even after two-and-a-half months after the May 2017 disasters. Especially, information related to the impact on the informal sector will remain unavailable, unless a comprehensive survey is conducted. Such a survey is a mandatory requirement under the National Insurance Trust Fund – supported (NITF) National Natural Disaster Insurance Scheme, to provide compensation to damaged business establishments. The NITF insurance scheme covers all SMEs, up to LKR 2.5 million. However, such assessment was not available at the time this PDNA was conducted. Therefore, the PDNA team accessed different sources, including the National Enterprises Development Authority; District Chambers of Commerce, District Secretariats, Divisional Secretariats, Banks, and Insurance providers.

In the PDNA, effects constitute of damages and losses. Damages are effects on physical assets and inventory, while losses are forgone production and income flows. Damage estimation of the formal sector enterprises was based on insurance claim data from 14 insurance companies. Losses in the formal sector, and damages and losses in the informal sector, were estimated based on the Divisional Secretariat-level baseline information obtained from the Department of Census and Statistics (see details in Assessment Methodology).

Damages and Losses

Unlike the floods in the May 2016 disasters, the May 2017 floods have been described as a

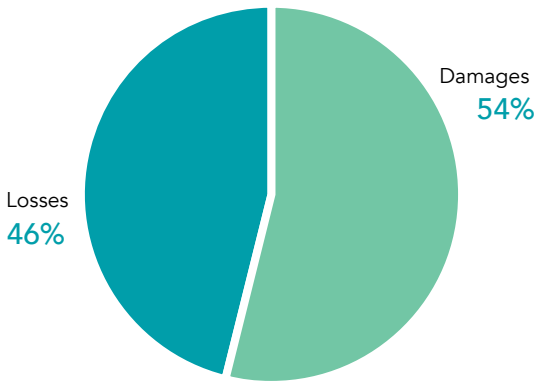

FIGURE 13: PERCENTAGE OF TOTAL DAMAGES AND LOSSES

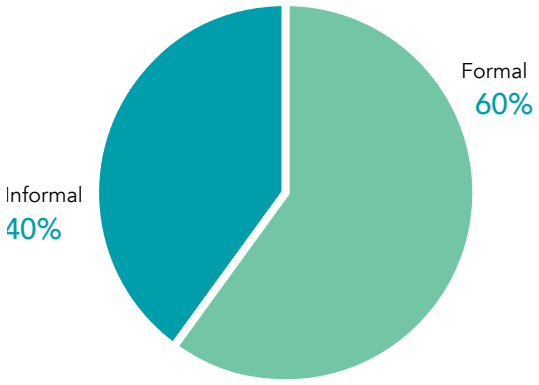

FIGURE 14: PERCENTAGE OF TOTAL DAMAGES AND LOSSES IN FORMAL VS INFORMAL ENTERPRISES

flood situation with greater force of current. This perception is supported by the increased damages to the housing sector; floods and landslides completely destroyed 3,008 houses and damaged another 74,301. Therefore, even though the actual figures are not yet available, it is safe to assume that business premises and equipment, which were exposed to the disaster, would have suffered a similar impact. It is also assumed that businesses which were not directly exposed to the disaster, would also have incurred revenue losses due to delays in accessing raw materials from suppliers, and employees not reporting to work. The disruption of the informal sector business and the SMEs, which are often part of larger value chains, is expected to have caused medium- to long-term impacts to many businesses. The flooding lasted approximately a week, and the most-affected trading establishments are likely to have experienced a drop-in sales volume and the negative effects would have continued even after the flood waters receded. Businesses reported higher costs and lower revenues for some time beyond the week following the floods, until demand and supply was readjusted. In 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.

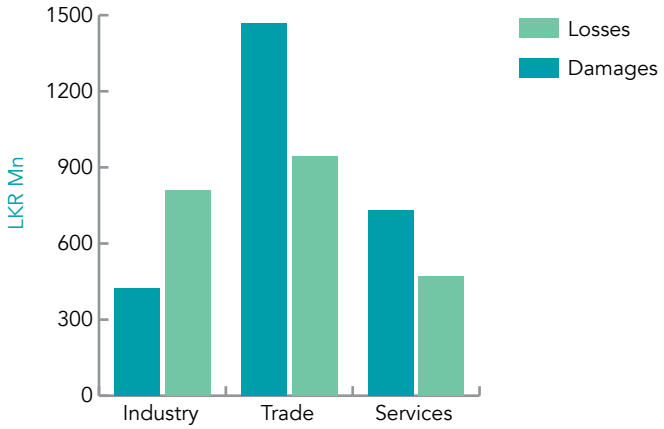

FIGURE 15: SECTOR WISE DAMAGES AND LOSSES

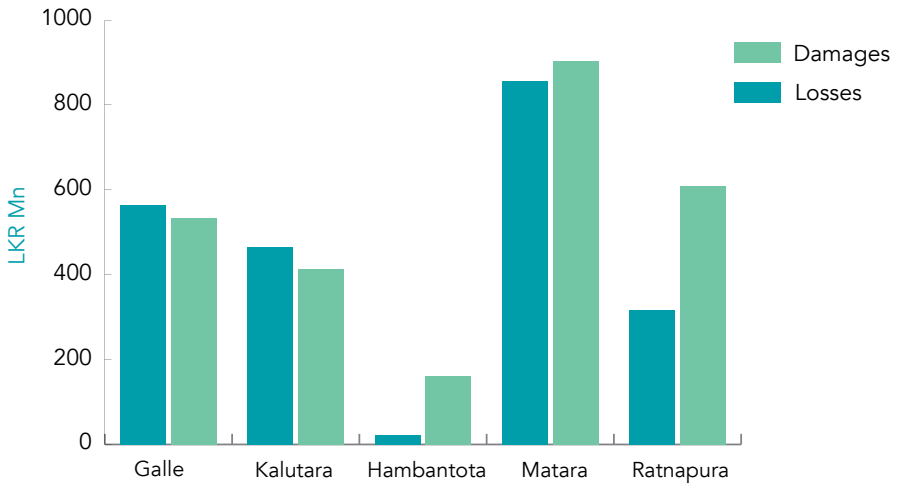

FIGURE 16: DISTRICT-WISE DAMAGE AND LOSSES

According to the estimates made under this assessment, the Industry and commerce sector reported a total of LKR 4,845.53 million by way of damages and losses (Table 36). Out of the total damages and losses incurred in the May 2017 disasters, 60 percent was reported in the formal sector, of which 65 percent are damages claimed from insurance providers, which amounts to LKR 1.93 billion (as it July 15, 2017) (Figure 14).

The majority of the total effects of the May 2017 disasters have been reported as damages, while losses incurred reflect 46 percent of the total effects (Figure 13).

50 percent of total damages and losses incurred in the Industry and Commerce sector, equivalent to LKR 2,410.6 million, have been reported in the trade sector. The services' sector represents approximately 25 percent of the total effects (LKR 1,200.82 million). The industry sector has incurred about 25 percent, of the total effects (LKR 1,234.05 million), of which 66 percent is related to losses. Both in the trade and services' sectors, damages are comparatively higher than losses (39% of the total effects).

59 percent of the total damages and losses have been reported from Matara and Galle districts. In Hambantota, damages are significantly higher than losses. Out of LKR 161 million damages reported in Hambantota, LKR 151 million were reported from insurance claims of 57 business establishments. A close analysis of insurance data shows that a hotel in Tangalle in Hambantota district has claimed over LKR 100 million for damages caused by the floods. Looking at the insurance claim, it can be assumed that the said hotel facility has faced a severe impact and adverse effects due to the disaster. However, the estimation used here does not capture the special cases as listed above. (Table 36)

Employment

According to the available data, a total of 342,955 persons in the active work force in four districts (data of Hambantota district not available) has affected by the flood and landslides in May 2017. Out of that 42,936 persons (12.5%) has been reported as severely affected.[36] Number of active work force affected by sectors was calculated based on the percentage of population employed in main industry sectors of the relevant districts, accordingly the highest

36. Calculated from data given in Rapid Impact Assessment Report of DMC released on 1st June 2017

TABLE 36: LOSSES AND DAMAGES CALCULATION FOR FORMAL AND INFORMAL SECTOR ENTERPRISES (INDUSTRY/TRADE/SERVICES)

Nature of damaged	District	Estimated damage and losses in industry and commerce sector							
		Industry		Trade		Services		Total	
		Losses (LKR.)	Damages (LKR.)	Losses (LKR.)	Damages (LKR.)	Losses (LKR.)	Damages (LKR.)	Losses (LKR.)	Damages (LKR.)
Totally Damaged Informal enterprises	Galle	2,359,126	2,900,545	10,225,927	5,608,987	4,328,852	3,795,634	16,913,905	12,305,166
	Kalutara	3,318,846	4,492,218	12,150,454	7,503,573	5,429,037	5,792,144	20,898,337	17,787,936
	Hamban-thota	3,053,286	2,068,206	4,643,494	1,805,319	1,734,597	1,239,538	9,431,376	5,113,063
	Matara	6,976,436	8,870,928	25,661,682	13,480,715	13,037,090	10,387,039	45,675,208	32,738,681
	Rathnapura	4,683,951	5,363,128	23,466,936	10,841,066	10,433,478	7,736,016	38,584,365	23,940,211
Total		**20,391,645**	**23,695,026**	**76,148,493**	**39,239,660**	**34,963,053**	**28,950,371**	**131,503,191**	**91,885,057**
Partially Damaged Informal enterprises	Galle	38,447,695	31,405,001	163,953,488	60,331,874	68,969,573	41,974,647	271,370,757	133,711,522
	Kalutara	23,143,699	41,252,962	167,237,197	69,528,648	75,122,035	54,908,323	265,502,931	165,689,933
	Hamban-thota	2,998,030	1,878,910	6,855,692	1,689,343	2,147,805	1,148,087	12,001,527	4,716,339
	Matara	32,393,594	55,261,368	214,384,734	79,111,922	115,150,929	68,278,362	361,929,256	202,651,651
	Rathnapura	11,716,010	19,635,884	134,031,584	43,046,347	59,657,077	31,177,417	205,404,671	93,859,648
Total		**108,699,027**	**149,434,125**	**686,462,696**	**253,708,134**	**321,047,420**	**197,486,835**	**1,116,209,142**	**600,629,094**
Formal sector damages and losses	Galle	234,516,608	104,615,605	26,775,109	245,928,293	14,421,318	36,015,334	275,713,035	386,559,232
	Kalutara	140,604,885	31,751,953	24,593,661	177,258,862	14,501,715	20,953,715	179,700,261	229,964,530
	Hamban-thota	434,740	5,395,085	1,247,723	35,683,920	200,861	110,262,892	1,883,324	151,341,897
	Matara	275,327,823	80,175,662	101,313,004	518,132,055	71,371,949	70,022,273	448,012,776	668,329,990
	Rathnapura	31,072,411	27,935,020	27,774,496	196,396,238	13,349,431	267,272,825	72,196,338	491,604,083
Total		**681,956,467**	**249,873,325**	**181,703,994**	**1,173,399,367**	**113,845,273**	**504,527,039**	**977,505,733**	**1,927,799,731**
Total Losses/damages in all five districts		**811,047,139**	**423,002,476**	**944,315,182**	**1,466,347,161**	**469,855,746**	**730,964,245**	**2,225,218,067**	**2,620,313,882**
Total Losses and damages in the five districts									**4,845,531,949**

TABLE 37: NUMBER OF ACTIVE WORKFORCE AFFECTED BY MAIN SECTORS

District	Active workforce affected			Sector					
	Severely	Moderately	Total	%	Agriculture	%	Industry	%	Services
Galle	3,875	42,559	46,434	34.6	16,066	24.0	11,144	41.4	19,224
Kalutara	3,618	66,116	69,734	15.8	11,018	31.1	21,687	53.0	36,959
Matara	12,891	109,500	122,391	37.4	45,774	23.3	28,517	39.4	48,222
Ratnapura	22,552	81,844	104,396	37.2	38,835	27.5	28,709	35.4	36,956
Hambantota			-	36.6	-	26.2	-	37.2	-
Grand Total	**42,936**	**300,019**	**342,955**		**111,694**		**90,057**		**141,361**
Foraml (40.2%)					44,901		36,203		56,827
Informal (59.8%)					66,793		53,854		84,534

TABLE 38: AFFECTED ACTIVE WORK FORCE BY STATUS OF EMPLOYMENT AND FORMAL/INFORMAL SECTORS

Status of Employement	Total		Formal		Informal	
	%	Persons	%	Persons	%	Persons
Total	100	342,955	40.2	137,711	59.8	205,244
Employees	56.1	192,398	64.8	124,684	35.2	67,714
Employers	3.1	10,632	45.3	4,814	54.7	5,818
Own account worker	32.3	110,774	5.2	5,740	94.8	105,034
Contributing family worker	8.4	28,808	8.2	2,353	91.8	26,455

number of affected employed population is in the service sector. Summary of affected active work force according to the districts and on main sectors is give in the Table 37.

Affected active work force by status of employment, formal and informal sectors calculated based on the national averages is given in the Table 38.

According to the findings through field missions & discussions with the key informants in the districts, around 75%of the formal sector enterprises have started operations at the possible scale within two weeks, and over 90% of the rest within two months of the disaster.

This impact was particularly important for self-employed people; i.e. fruit vending, gardening, home repairing, shoe making and manufacturing bricks. As a consequence, families in the area have difficulties to pay their loans for 3–4 months as their source of income was lost. Their psychological pressure due to such has not been assessed.

5.4. IMPACT ANALYSIS ON DEVELOPMENT GOALS

As a percentage of GDP, the Industry sector accounted for 26.8 percent of the GDP, and the Services' sector, including wholesale and retail trade, contributed 56.5 percent to the entire GDP in 2016 (CBSL, 2016). This shows how important these two sectors are for the country's economy. Despite heavy damages and losses caused to the sector in the 2016 floods, the annual report of the Central Bank gave a positive outlook to the industry and service sectors' growth in 2016. However, the Annual Report does not carry any analysis on the impact of disasters on the industry and services sectors' overall performance. The overall analysis of the Industry and Commerce sector of Sri Lanka is given in the PDNA of 2016.

Of the labour force of the country (7,830,976 persons), 71.4 percent belong to the industry and services sector (includes wholesale and retail).[37] As per the Department of Census and Statistics' Non-Agricultural Economic Activities in Sri Lanka survey, 23 percent of the Industry and Service enterprises are located in the five districts covered in this PDNA. However, unlike the May 2016 disaster, the concentration of this year's disaster had been in rural areas, and the overall impact on the country's economy is not expected to be as significant.

5.5. CROSS-CUTTING ISSUES

As discussed in PDNA 2016, lack of disaster preparedness in the industry and commerce sector is a major weakness, exposing them to a high level of damages and losses. Even though the insurance-claim data of the May 2017 disasters is 15 folds smaller compared to 2016 data, this does not necessarily mean that impacts were less significant. It could also mean that insurance coverage was not available for large- or medium-scale businesses that were covered by insurance, as well as that there has been a significant level of damages and losses in the sector that has not been captured due to data and information gaps. Analysis of PDNAs 2016 and 2017 show that continued ignorance of the exposure levels of private businesses, including the informal sector, and impacts of recurrent disasters on businesses, are quite alarming. Lack of, and low levels of disaster preparedness of the business sector, if not addressed as a priority, will lead to a much bigger catastrophe in the future. This PDNA reiterates the importance of business-continuity planning, and building the sustainability of value chains, as these are unavoidable conditions that are important for resilience building, and the eventual sustainability of the sector

In addition to the above, employment details are not available in the sector disaggregated by gender, making it difficult to assess different impacts of the disaster on men and women.

37. http://www.statistics.gov.lk/samplesurvey/LFS_Annual%20Report_2015.pdf

It is well-established that disasters reinforce prevalent and malignant social inequalities, including gender inequality, if appropriate policy measures and actions are not taken. Lack of gender-disaggregated information made it more difficult to assess impacts on women, who are well-recognized to be disproportionately impacted, and a majority of whom are involved in the informal business sector. Therefore, it is difficult to recommend specific measures to minimize gender-specific risks and vulnerabilities related to employment, and to provide appropriate guidance to ensure equal opportunities for speedy recovery.

5.6. RECOVERY AND RECONSTRUCTION STRATEGY

Since the recommendations provided in the PDNA 2016 are still valid and have not been implemented yet, this PDNA re-emphasizes the importance of giving due attention to them. Even though, the government's National Natural Disaster Insurance Policy (NNDIP) covers all SMEs with an annual turnover less than LKR 10 million, lack of a systematic approach to conduct damage assessment and reporting, has significantly delayed the compensation process. It is clear from the baseline information and field visits that over 80 percent of the affected business establishments, fall in the Micro and SME sectors. Delays in government-supported NNDIP compensation will delay the recovery as they have no other risk-transfer options.

On the other hand, this group (representing the 80 percent of the total) is also the sub-sector which is at higher risk, more vulnerable, and often not covered by a private insurance company. As mentioned in the DRR and Environment chapters, ever so often, they also contribute to further aggravating existing risks and generating new risks; by settling and expanding in high risk areas, forced by socioeconomic considerations, and by their own business practices. Improving the efficiency of the national insurance cover will bring immediate short-term benefits to the economy. It, however, may not create adequate incentives for small/micro businesses to actively engage in risk-reduction/management, whereas improving the supply of private insurance services will help in this context better.

It is critical to identify and put in place mechanisms that will effectively assess disaster damages in the industry and services' sector. This should provide required support to all industries and services, including small and informal businesses to recover fast from a disaster, while providing incentives to move towards becoming risk-sensitive and -resilient businesses.

Granting concessions to— both the informal and formal sector borrowers who have been affected by the floods is also important to allow the businesses to recover from the impact of the disaster. The Central Bank of Sri Lanka issuing a circular on May 29, 2017, has already granted a moratorium of not exceeding 3 months in respect to all performing credit facilities of borrowers as on May 25, 2017 which have been affected by floods. The Central Bank has also decided to waive the penal interest on overdue loans of the borrowers under the above moratorium, as well as of affected non-performing borrowers who are willing to settle their loans on rescheduled terms.

It is also important and urgent to identify the hazard-prone areas, and elements exposed to different hazards. As mentioned earlier, the Department of Census and Statistics has already developed baseline information on the industry and services' establishments in the country. It is required to geo-reference these data and overlay on hazard maps to identify the elements at risks. The same methodology can be used in initial damage assessment, and to expedite the subsequently more comprehensive assessments.

TABLE 39: RECOVERY CALCULATION FOR FORMAL AND INFORMAL SECTOR ENTERPRISES

No	Recovery need	Cost (LKR. Mn)		
		Short Term	Medium term	Long term
1	Conduct a comprehensive survey to assess the damages and losses incurred to the informal sector	5		
2	Identify and establish a mechanism to collect damage and loss data for industry and trade		5	2
3	Develop guidelines for the SMEs for business continuity planning		3	
4	Conduct a programmes for chambers of commerce and its members on the importance of business continuity planning and risk transferring		6	10
5	Develop a training module and conduct TOTs for the representatives drawn from chambers and other SME consultancy agencies on business continuity planning		5	5
6	Develop risk profiles and make those available for the private sector	Cost is covered under DRR		
7	Conduct full scale risk assessment to Kalu river basin	Cost is covered under DRR		
8	Build the capacity of planners at both local and national level on disaster risks and risk sensitive planning	Cost is covered under DRR		
	Total	**5**	**19**	**17**
	Grand Total			**41**

Recommendations

Collect baseline information in the Industry and trade sector: Ensure pre-disaster baseline data are collected and compiled, including the geographical location (GIS based) to provide a comprehensive and comparable picture. A mechanism should be established to collect the post-disaster data based on the exposure maps. Sex and age disaggregation of all data is strongly recommended.

Establish zoning and enforce the existing laws: Conducting flood hazard mapping in all flood-prone river basins is becoming a critical factor. The World Bank-supported CRIP Project is conducting such assessments in 10 river basins, while UNDP supported Climate Resilient Integrated Water Management Project will conduct risk assessment in three more river basins. It was noted that exposure maps for Kalu river basin is not available yet. Those should also be expanded to vulnerability mapping in order for it to be useful for risk management. Once these assessments are available, disaster risk management measures should be incorporated into sectorial and integrated development planning, with the technical expertise of the Ministry of Disaster Management.

Strategic push should come from issuing business registration and bank loans based on the measures taken by the owners in reducing disaster risks. It is also important to encourage insurance providers to use risk information in providing insurance and setting insurance premiums. The informal sector should be provided with additional support by encouraging and facilitating civil society organizations to engage in building their awareness on disaster risks and measures that can be taken to reduce disaster risks.

Establish/Monitor Business Continuity Planning: It is required to promote business continuity and disaster-preparedness planning among all enterprises in order to reduce future impacts. The Ministry of Disaster Management shall work with the Chambers to build tools, methodologies, and training programs for Business continuity planning for the private sector. Chambers should assess the feasibility of maintaining a dedicated resource pool to provide technical expertise to the private sector in their development of business continuity plans.

Ensure insuring the 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. Various options that can be used to transfer, share and reduce risks such as micro-insurance products, extending National Insurance Trust Fund cover to all SMEs as defined in the National Policy Framework for SME Development, should be considered.

Conduct impact assessment to informal sector: A comprehensive study should be carried out to assess the impact on individual informal businesses, and to expedite the provision of the compensation under the National Insurance Trust Fund-supported (NITF) National Natural Disaster Insurance Scheme, to facilitate the speedy recovery of the informal sector.

Recovery and Reconstruction Needs with Costs

(Table 39)

5.7. IMPLEMENTATION STRATEGY FOR RECOVERY

The World Bank-supported Disaster Damage and Loss assessment system will be fully implemented by the Disaster Management Centre, supported by the National Planning Department. The data formats prepared under the initiatives have serious gaps, which need to be solved by joint discussions with Disaster Management Centre, and sectorial agencies, with the active support of the National Planning Department on priority basis. The Ministry of Disaster Management, with the support of the

National Disaster Relief Services Centre, will complete damage assessment for the May 2017 disasters to expedite compensation provisions under the NITF-supported National Natural Disaster Insurance Policy. The Ministry of Disaster Management will also work closely with the Ministry of Industry and Commerce to implement the recovery needs. Further, the Ministry will provide the technical input, and will work closely with the Chambers of Commerce, and Ministry of Industry and Commerce, to promote business continuity planning.

Ministry of National Policies and 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 NNDIP.

5.8. 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, via the Insurance Board of Sri Lanka. The Team considers the data collected from insurance companies as more reliable though the coverage is low. Most insurance companies could only provide reported information relating to their customers – mainly in the industrial sector – and 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.

The Ministry of Industry and Commerce, with the support of National Enterprise Development Authority has initiated a data collection from individual enterprises, but at least a partially completed dataset was available only in Rathnapura. It has been noted that damage data was obtained from the affected enterprises without a technical assessment, thus the data was not verified. The authorities are facing difficulties in conducting the assessment as the baseline information was not readily available. Even though baseline information is available with the Department of Census and Statistics, due to lack of a national platform for data sharing, these data are not readily available for the Ministry of Industry and Commerce to compile the damage-related assessment. Lack of a suitable mechanism to assess the affected enterprises, and to conduct a formal damage assessment is perceived as a serious gap in both the PDNAs. In addition, even though the format used by the Ministry of Industry and Commerce 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.

Since information on the informal sector was not available, the approximations were done based on the baseline data collected during the Household Survey of the Census & Statistic Department, and the percentage of buildings affected due to the flood situation. This information was triangulated by conducting community consultations and field visits.

Estimation of Damage and Losses in the Informal Sector

In the informal sector, damages and losses were calculated assuming that some businesses were completely destroyed, and some were partially damaged due to the disasters (in both cases, by using the percentage of households fully and partially damaged). Damages in the totally destroyed businesses were estimated using the median asset value of those businesses, based on data from the Department of Census and Statistics.

Formula for estimation of the damages in totally destroyed informal businesses establishments:

Number of Establishments × % Affected × Median Asset Value

Damages to partially-damaged businesses were estimated using the same formula, and LKR. 50,000 as the damage value per business establishment.

Losses were estimated for six months for the fully-damaged businesses and for two months for the partially-damaged businesses. Losses in employment were not calculated in this assessment.

Median annual turnover × number of establishment × (Trade/industry/services) × %affected × 6 /12

Estimation of losses in the Formal Sector

Losses were estimated in the formal sector using the same formula used in the informal sector, but for 2 months irrespective of the level of damage (i.e. full or partial). ■

SECTOR REPORTS

INFRASTRUCTURE SECTOR

6. Irrigation

6.1. EXECUTIVE SUMMARY

The irrigation sector plays a vital role in the agricultural production and rural development of Sri Lanka. About 70 percent of the country's population lives in rural areas and a large majority of the rural population are engaged in agriculture as it is their main source of livelihood; mainly rice production under irrigated conditions.

The impact of the May 2017 flood was felt mainly in the mid-catchment regions of the above-mentioned rivers, affecting and disrupting routine economic activities of the families in areas getting inundated without timely warnings.

- In Kalu ganga, the upstream and downstream areas of the Run-of-river Hydro Power dam in Kukule and Millakande;
- In Gin ganga the areas above Nagoda, Tawalama, Udugama and Neluwa and;
- In Nilwala Ganga, starting from Akuressa up to Morawaka and Kotapola, areas remained inundated for many days. Some Government officers had been evacuated using the services of helicopters by the Air Force, and by the Navy using boats.

Many medium- and small-sized irrigation and regulatory structures, including bridges had been dislodged due to rapid and high flows, with bamboo plantation bushes in rivers, and uprooted canal reservations, blocking the structures.

The May 2017 flood occurred when the paddy cultivation was only 4 to 5 months old. Therefore, immediate action was taken under the above-mentioned schemes to re-cultivate the damaged paddy by clearing the preliminary obstructions in irrigation and drainage canals soon after the flood waters receded, as well as by supplying seed paddy via the Agriculture Department.

The total estimated cost of the reported flood damages and losses in 2017 to the irrigation and flood control infrastructure of the country is LKR 1,535.9 million. The damages and losses shall be recovered following a phased short-term and medium-term strategy as outlined below, for which the estimated costs are: Short-term LKR 154 million, and medium-term LKR 2,288 million.

6.2. PRE-DISASTER CONTEXT AND BASE LINE

The irrigation-related infrastructure of the country serves a total command area of about 564,000 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. Ninety percent of the irrigated lands are used to grow rice. In addition, cash crops are also grown under irrigated conditions. The total harvested area ranges from 700,000 to 1,100,000 hectares -of which, an average of 75% is irrigated. Irrigation infrastructure, therefore, helps in sustaining the self-sufficiency of the rural population when it comes to staple-food production, as well as their livelihoods.

The irrigation infrastructure of the country has been classified as follows, based on the area served by the scheme: minor (small or village) scheme (command area of 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). There are 517 major and medium irrigation schemes, irrigating about 450,000 ha with an accumulative storage capacity of 7,287 MCM (million cubic meters). Minor irrigation schemes (29,369) irrigate 311,000 ha with an accumulative storage ca-

pacity of 1,400 MCM. With a population of around 22 million, Sri Lanka has a per capita storage capacity of about 395 m^3, considered high in comparison with other Asian Countries.[38]

The responsibility of operating and maintenance of the irrigation infrastructure, and associated drainage facilities are divided among several government agencies: Major irrigation schemes managed by the Mahaweli Authority of Sri Lanka (MASL) and the Irrigation Department (ID); medium schemes are managed by the ID, as well as by the nine Provincial Irrigation Departments, and the minor schemes managed by the Department of Agrarian Development (DAD). The Provincial IDs are also responsible for major repairs and rehabilitation, as well as the improvement works of minor schemes maintained by the DAD.

The Irrigation Department (ID) manages 340 major irrigation schemes, feeding 288,000 ha of farmlands, and 21 flood control and saltwater exclusion drainage schemes. The Mahaweli Authority of Sri Lanka (MASL) manages another 104,000 ha, serving 180,000 farm families under Mahaweli System and Udawalawe Reservoir schemes. Apart from them, there are medium and minor irrigation small Tanks & Diversion anicut schemes maintained by the ID, and the Provincial Irrigation Department and Department of Agrarian Development (DAD) – commanding 216,000 ha and scattered rain-fed paddy cultivation of 200,000 ha.

The existing irrigation, drainage and flood control infrastructure of Sri Lanka are vital not only for supply of water for agricultural production, but also for the removal of excess agricultural and storm water from the farms, as well as for the protection of people and assets, including farm lands and standing crops, against the disastrous effects of major floods. The major flood-protection schemes typically consist of earthen flood embankments, designed for varying estimated periods of 5- to 8-day rainfall storms in the catchment watersheds, to provide protection to paddy, vulnerable mixed settlements, and townships.

Major flood-protection levees, and lock-gate structures, had been implemented since 1925 in Kelani Ganga, and Kalu Ganga, including the Bolgoda Basin by the British to provide 'Protection to the City of Colombo'. In Kelani & Kalu Ganga Basins, several flood protection schemes against minor floods had been constructed during early 1930's by the British– to isolate and give protection to paddy crops, and the areas in both banks near the coastal regions, including the Bolgoda basin. Of late, minor flood-protection schemes to afford protection to rain-fed paddy cultivation have been put in action in Gin Ganga and Nilwala Ganga basins, including small pumping stations. These schemes are maintained by the respective Irrigation Department Divisional Engineers in the districts.

- The ***Gin Ganga Flood Regulation Project,*** implemented during 1976-1982 by the Chinese Government (grant aid project called 'Drainage and Flood Control project') was oriented to provide protection to rain-fed paddy of 4,928 acres.[39]

- The ***Nilwala Ganga Flood Control*** Project by a French consortium of consultants during 1983-1992 on a 'Turnkey Project' was initiated to provide increased irrigation facili-

38. Irrigation Knowledge Centre March 2014, Dept of National Planning and Ministry of Finance & Planning.

39. The Gin Ganga Regulation Project, covers earthen levees from Agaliya down on either banks of the river (22 km long) to connect high spots, the construction of 10 pumping stations in 10 drainage districts, 32 km of new transmission lines, the construction and widening of 22 drainage canals 26 km long, and an administration block, and switching station to manage pumping stations. PL2 (GP3) is the only pumping station, which was being used for both drainage and irrigation in the protected area.

The Nilwala Ganga Flood Control Project

In Nilwala Ganga Flood control project, only the two large lower perimeters in the flood plain, close to Matara township, namely the Kiralakale and Kadwedduwa sectors of protected areas (1990 ha and 1845 ha respectively), were implemented under two phases, commencing from August 1983 till 1989. The work in Kiralakale sector included 11 km of bunds on the right bank with a pumping station capacity of 32 m3/sec (8 pumps of 4 cumec), a Gravity outlet with a capacity of 16 m3/sec., 4 Anicuts across 4 bunds, and a spillway on Br 05 Bund. The total length of drainage canal was 65 km with 46 new structures for irrigation and road crossings. Kadwedduwa sector had 11 bunds of 3.1 km length, 55 km of drainage canals, 55 new structures with 180 sluices, a pumping station with a capacity of 56 m3/sec (14 pumps of 4 cumec), a gravity sluice of 16 cumec, and 4 Anicuts on 4 bunds to permit water from Kirama ara for irrigation. In addition, the existing irrigation network from Urapola, Hanaragoda, and Pettare schemes improved an additional extent of 350 ha under water management, to be used as an extension. Further, under stage 11, protection to Akuressa town from a 2-year design flood was devised by constructing a spill at Panadugama (30 m long to divert 200 m3/sec), and a provision to provide about 1.5 km u/s of the town to allow water to spread over the fields, and to flow back to the river at Balukawela, 4 km D/S of the town, with a flood bund from Panadugama to Balukawela to protect the town. Irrigation facilities included a hydro mobile pump, and 4.2 km of canals excavated on excavated on raised beds, installed with Neyretic 19 baffle distributors, siphons, and other crossing structures.

ties, as well as flood protection, to the Paddy cultivation and townships in the lower flood plains of the river -areas that are annually affected by floods.

- The Holuwagoda Basin –the largest drainage area comprising 6 anicut schemes (command area 450 ha), which discharged its runoff just upstream of Wakwella Water supply intake was cut off by a flood bund and linked with the existing Kepu Ela, and allowed to discharge directly to the sea outfall at Mahamodera. This outfall had to be cut open during flood time with the help of standby equipment. This outfall was later improved by constructing groynes to avoid prolonged inundation of paddy lands for which, previously, the Coast conservation had not agreed to, even after carrying out model studies. A new bridge across the river at Baddegama and a roadway was constructed to shift the population of Baddegama Township, which was getting inundated, to afford protection. The total area that has been protected is 4928 ha of rainfed paddy.

- The minor protection methods of Kadduwa R3 sector included 4 additional bunds, a miniature pump house at Thalgahagoda to protect 455 ha of paddy fields with improved irrigation facilities, and preventing the inundation of Malimboda area and other villages in Matara Hakmana Road Deviation on the protected side with a new bridge, adjacent to the existing bridge to widen and improve the flow of the river.

6.3. POST-DISASTER EFFECTS

In 2007 a severe drought condition was affecting the entire country, more severely many districts along the North-East region. On May 23, the Department of Meteorology forecasted the onset of South East Monsoon and heavy rainfall from May 24, 2017, and also of possible cyclone effects.

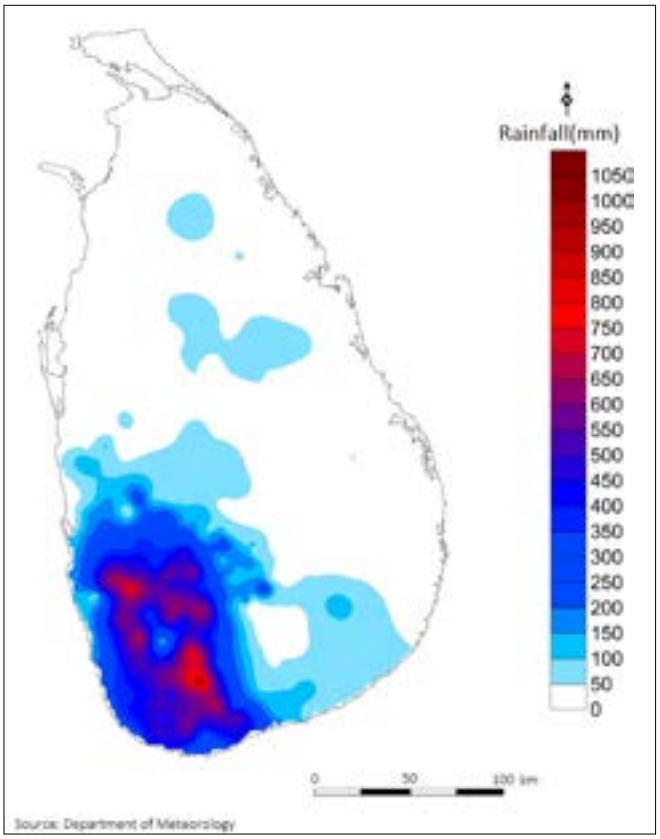

FIGURE 17: CUMULATIVE RAINFALL FROM 24TH – 30TH MAY 2017

Acting on above-received Intel, the Director, Hydrology Division, had taken steps to inform all Divisional Irrigation Engineers in charge of the river basins' infrastructure, using the Online Data transmission of the national Hydro-Meteorological Information system (HMIS). This system with modernized and improved Equipment (under the Dam Safety and Water Resources Planning Project funded by the World Bank), comprises 122 ID Stations covering most of the Major River Basins (90% complete).

As a result, the main observations in the main river basins are as follows:

Kalu Ganga Basin: Millakande ID Station received the highest rainfall of 615mm and Kukulegama run of the river, CEB Hydro power station received 553/326.4 mm on the May 25, while Ratnapura and Kalutara Putupaula hydro stations received 326 mm and 296 mm rainfall on May 25.

Gin Ganga Basin: Tawalama hydro station received 146 mm rainfall and 281 mm rainfall on May 23rd and May 25th respectively, while Baddegama and Indigasketiya hydro stations received 211 and 210 mm rainfall on the 24th. Galle Met station received 158.44 mm rainfall on May Gin Basin received much less rainfall, when compared to Nilwala and Kalu Ganga Basins.

In the Nilwala Basin, the flood levels at Urawa and Pitabeddera exceeded and reached the maximum gauge levels and the river, urging the staff to leave the station. 7 rain gauge stations in the catchment recorded more than 200 mm rainfall and 4 stations, namely Pitabeddera, Panadugama, Ellawela, and Denagama tanks stations recording more than 325 mm rainfall on May 25, the highest recorded rainfall standing at 354 mm at Panadugama station in Akuressa. The high runoff caused the washing away of the Kotapola Bridge, and Morawaka town getting more than 12 ft under water.

Damage and Losses to Irrigation Sub Sector – May 2017 Flood

- The major flood protection schemes of Gin and Nilwala Ganga suffered severe damages mainly on account of heavy incessant rain storms over-riding the designed flood protection works of return periods of 20 years in Gin, and 10-year design period in Nilwala, with over flood waters overtopping the bunds, especially in Nilwala Project.

- The flood levels in Gin Ganga reached the bund top level of the Baddegama bund (BL 11), which threatened the residents with seepage flows, along with one other bund (BR1) at Hegoda Boosa. The main cause for the BL11 bund at Baddegama was due to the existing narrow steel bridge – there were proposed plans to widen it as per its original design. The above proposal was

subsequently changed by the Government of China team, acting on the request of the Government of Sri Lanka to give protection to Baddegama town. As such, new proposals were made by the Irrigation Department to shift the old town outside the bund and constructing a new bridge across the river at Baddegama to provide safe access to Nagoda Road on the right bank by constructing the road through the Baddegama Estate.

- The Nilwala River overflowed over the spillway at Panadugama bypass (reached 8.7 m) causing minor damages to irrigation infrastructure in Akuressa. The spillway at Panadugama, blocked with bamboo plantation bushes, and other debris causing severe inundations upstream, had been removed as a priority to make the Kamburupitiya road accessible. The unit office, and quarters at the site, which were flooded had to be refurbished.

- In Kiralakale sector close to Matara town, the BR 05 bund, which was provided with an emergency spillway, was overtopped first, causing inundation in the protected area. Subsequently, the BR 04 and BR 03 bunds overtopped, causing damages to bund surface and downstream slopes of the Bunds. These bunds had not been maintained annually in the past.

- Due to the Kiralakale sector getting inundated, a paddy extent of about 800 acres, along with another 200 acres – which suffered due to water shortage prior to the flood – suffered damages and had to be replanted as the cultivation was only about 4 weeks old. Presently, about 1300 acres have been replanted with seed paddy provided by the Agriculture Department.

- The newly-constructed Gravity outlet close to the SPR1-2 pumping station also suffered erosions in the earth-filled banks, and is being repaired. Out of the 8 diesel pumps at SPR1-2 Pumping station, only 5 had been serviceable at the time the flood occurred, and another two had been repaired and used for pumping to give early protection to areas flooded close to Hittetiya, Tudawa and Rahula road, as well as to residents around Nupe ela.

- In the Kadawedduwa Sector (Ph 11), the irrigation systems in Ellawela tank and Yatiyana anicut schemes also suffered extensive damages, and part of a road-way which had been washed away, had been repaired due to the urgency. The Pettare and the Urapola major anicut schemes had been under floods, up to a depth of 4 to 5 ft, causing damages on account of not being able to operate gates in time, and being stuck when efforts were made to lift it. As such, many gates had to be urgently repaired in addition to the removal of debris and removal of overbank fills and erosions. The Bunds BL 13 and BL 09 have also been reported as overtopped. 14 Pumps had been able to operate in addition to the two radial gates at the gravity outlet, while the other radial gate has been subsequently repaired.

- The irrigation facilities of Urubokka Oya Diversion, and Kekiri Obada Oya Reservoir, and Kirama Oya Diversion acing schemes in the Nilwala upper catchment, serving Weeraketiya division in Hambantota district were reported to have suffered from damages to their anicut schemes, and canal systems.

- In the Kalu Ganga Scheme, most of the damages have been from the minor flood-protection schemes in Kalutara district, which had risen due to excessive rains in Rakawana and Millakanda area, coming from the Kukule Ganga flooding. The flood levels observed at Palatota Major Flood Lock gate, which was meant to prevent flood water in Kalu Ganga from entering Bolgoda via Kepu Ela, which threatened even the residents in Panadura showed that it was able to withstand the flood situation in Bolgoda basin.

TABLE 40: PHYSICAL IMPACT ON IRRIGATION INFRASTRUCTURE

Type of Infrastructure	Unit	District					TOTAL
		Galle	Matara	Hambantota	Kalutara	Ratnapura	
Damage to distributory and field canals	Nos	144	608	87	58	62	959
Damage to Canal Structures	Nos	13	46	-	-	1	60
Damage anicuts	Nos	91	261	41	59	105	557
Farm Roads	Km	20	29	2	5	-	56
Bridges and culverts	Nos	-	9	3	1	-	13
Damage to tanks	Nos	-	2	52	-		54
Administrative buildings	Nos	-	-	-	15	-	15

TABLE 41: DAMAGES AND LOSSES – IRRIGATION INFRASTRUCTURE

District	Damages (LKR Million)	Losses (LKR Million)
Ratnapura	126.4	4.8
Kalutara	142.0	11.6
Galle	1434	0.5
Matara	750.5	14.7
Hambantota	373.6	–
TOTAL	**1,535.9**	**31.6**

TABLE 42: PHYSICAL IMPACT ON FLOOD CONTROL INFRASTRUCTURE

Type of Infrastructure	Unit	Galle	Matara	Hambantota	Kalutara	Ratnapura
Damage to Flood Bunds	Km/ # of locations	58.1 Km	91	20	46	63
Drainage canals	Km	2.6 Km	-	-	-	-
Retaining walls	Nos	-	52	21	22	24

TABLE 43: DAMAGE AND LOSS – FLOOD CONTROL INFRASTRUCTURE

District	Damages (LKR Million)	Losses (LKR Million)
Ratnapura	–	–
Kalutara	8.0	15.0
Galle	95.9	–
Matara	156.8	45.0
Hambantota	18.1	3.0
TOTAL	**278.8**	**63.0**

The typical losses incurred due to the flooding included the expenditure required for the clearing of debris and garbage at the controlled structure gates, and subsequent damages to scouring of bunds in irrigation and drainage canals, which have to be attended to, in order to assure irrigation supplies and adequate drainage. Some of the losses include scouring and breaching of the embankments of several minor tanks, scouring of bunds of irrigation and drainage canals of several major, and medium and minor tanks.

The summary of the damages, and losses computed for the five districts are given in Table 41 and 43, for irrigation infrastructure and flood control infrastructure respectively. The short and medium-term recovery needs by districts is given in table 44.

The total estimated cost of the reported flood damages and losses in 2017 to the irrigation and flood control infrastructure of the country is LKR 1,909.3 million. The damages and losses shall be recovered following a phased short-term and medium-term strategy as outlined below, for which the estimated costs are: Short-term LKR 154 million, and medium-term LKR 2,288 million. (Table 40 to 44)

6.4. IMPACT ANALYSIS ON DEVELOPMENT GOALS

In the five affected districts covered by PDNA during the May 2017 flood, the irrigation schemes in Kalu, and Gin rivers have provided flood-protection facilities to mostly the rain fed area and improvement to existing anicut schemes. In Nilwala, Kiralakale, & Kadwedduwa sectors, the existing anicut schemes afforded flood protection, with improved irrigation facilities, and the extension of anicut schemes in Kirama Ara up to Tangalle and Weeraketiya areas, were increased in order to improve production capacity. Farmers' organisations were established, and training provided, to enhance water management for livelihood and generation of income.

The sustainability of these schemes depends entirely on the effective drainage of important main and secondary drainage canals, which are not given due recognition due to lack of funding, lack of equipment, and appropriate policy towards proper drainage management by the respective agencies.

Therefore, there is the likelihood for agricultural production to fall, impacting several development goals. Sri Lanka's Agriculture sector performed least during 2016 as was the case 2015. Agricultural production has declined due to climatic and adverse weather conditions, along with setbacks due to flooding and repeated droughts. This has led to increased food imports of products such as rice and wheat, and livelihood losses incurred by subsistence farmers, which continues to this day. In 2016, owing to falling agricultural output, its contribution to GDP was only 7.1%, down 10% in comparison to previous times.

Further, the status and role of women in agricultural production in the affected districts has been observed to be far less than optimal. While women are actively involved in main agricultural activities, as well as in diversified food crops generating off farm income, and in the farmer organizations, they are often relegated to the role of unpaid family workers without access to independent income. This status will have negative impacts on several development goals.

6.5. CROSS-CUTTING ISSUES

Environment: Natural Resources
(Applies to all the above river basins)

a) Damages to ecosystems, destruction of wetlands, encroachment, and improper land-use practices due to population growth and urbanisation (political interferences).

b) Sand Mining: Irresponsible issuance of permits for sand mining and poor enforce-

ment of regulations enhance river-bank erosion, as well as the deepening of the riverbed, causing increased intrusion of salinity at water supply intakes.

c) Gem Mining: Negative implications of mining activities utilising machinery and equipment in the riverbeds of Sitawaka Ganga in Kalu river basin, combined with washing activities, change river regime conditions.

d) Main Drainages: The main drainages coming within the major river basins are not well-defined and the responsibility of managing them, if there are no major/ medium Irrigation schemes, does not fall under the purview of any institution (eg: Concurrent list under the 13th Amendment). Managed mostly by the Agrarian Development, if falling under rain-fed conditions for paddy cultivation, land utilization is marginal and drainage is not adequately maintained and/or managed. This situation has caused many irreversible consequences during floods due to large-sized deep excavated pits remaining unfilled, which become breeding grounds for mosquitoes causing health hazards for the population nearby.

e) Archaeological and Cultural Loss: Inappropriate conservation leading to slip failures e.g: around Pahiyangala Rock Cave Site in Matugama in Kalu basin.

f) Pollution: Industrial discharges are released into water bodies including by enterprises at subsistence level with low productivity and low-economic returns.

6.6. RECOVERY STRATEGY

As irrigation is an integral part of agriculture, the upkeep of irrigation, drainage, and flood control infrastructure, are vital. Therefore, it is urgent that these damages are rectified at the earliest. If these damages are not rectified urgently, the lapses will not only affect the functionality and performance of the infrastructure but also have adverse impacts on the agricultural production, farmer's income, as well as increase the risk of floods in the future, affecting farm lands and other socio-economic assets in the areas already affected by the 2017 floods.

The general recovery strategy is to rectify the damages, and restore the performance of the damaged irrigation and flood control infrastructure assets as soon as possible, with the objective of minimising economic losses. The Government is currently rectifying the flood damages caused by the 2016 floods to irriga-

TABLE 44: SHORT AND MEDIUM-TERM RECOVERY NEEDS

District	**Recovery Needs (LKR Million)		
	Short Term	Medium Term	TOTAL
Ratnapura	5	164	169
Kalutara	27	195	222
Galle	59	240	299
Matara	60	1,180	1,239
Hambantota	3	509	512
TOTAL	**154**	**2,288**	**2,442**

** It is not clear how these needs costs were calculated. The strategies and the costing are normally included here. The damages to IDFlood levees inNilwala & Gin ganga have to be carefully investigated the causes of failure to determine the treatment and designs, which cannot be completed during 2018 and have to be continued. The replacement of Engines & Pumps also has to follow the same procedure.

tion infrastructure, with the help of various foreign-funded programmes. In the present context, government will adopt a three-stage approach to mitigate the 2017 flood damages.

The table below shows the district-wise needs distributed in short and medium-term period. However, a proposal of long-term period is stated in the narrative below.

The damages to ID Flood levees in Nilwala & Gin ganga have to be carefully investigated the causes of failure to determine the treatment and designs, which cannot be completed during 2018 and have to be continued. The replacement of Engines & Pumps also has to follow the same procedure.

Short-Term Recovery:

During the short-term stage, the focus will be on urgent recovery activities. The initial recovery needs of the flood protection schemes in Gin Ganga and Nilwala Basins will be to restore the affected pumps to working order in flood-affected pumping stations, in order to afford protection to the protected areas which were inundated due to spilling and overtopping of bunds. Along with this, the repair of minor damages can be undertaken with the budget immediately available to the agencies.

The PID of the Western and Southern Province is awaiting funds to be released by the Ministry of Irrigation to commence urgent repairs to minor irrigation infrastructure as reported by the Provincial Council Engineers, and Agrarian Services. A precise inventory of the damages is now been finalized, with the preparation of estimates to minor irrigation infrastructure according to the Divisional Officers of the Agrarian services Centre.

Medium-Term Recovery (2018):

In the medium-term recovery phase, farmers who lost their crops and could not replant on time will be given priority. In addition, minor irrigation and drainage canal systems, repairs to tanks, anicuts, and flank bunds, which needed urgent attention, have been identified and will be taken up for repairs before the commencement of the next cultivation season by the PID and DAD, via District Assistant Commissioners.

The Major Flood bunds in Gin Ganga at Baddegama, which had been showing signs of seepage, have to be carefully investigated to assess the defects. Precautionary measures will be needed to arrest the leaks by mud-grouting techniques or using appropriate strengthening methods. These bunds are almost 35 years old and the Irrigation Department is currently carrying out a detailed study to revisit the adequacy of the flood protection schemes in Gin Ganga.

The major bunds which overtopped in Nilwala Basin, need careful surveying and investigations to assess the repairs, including earth fill to the surfaces and slopes where erosion has taken place, to restore them to their original design standards. The Nilwala Diesel pumps have been partially replaced in the past few years and the remaining engines and pumps have to be replaced with immediate effect as these have been used beyond their design lifespan of 20 years. The replacing of 30-year-old French diesel engines have to be given priority during the medium-term funding /recovery.

Long-Term Measures (2019-2020):

The Government of Sri Lanka (GOSL) has obtained credit from the World Bank through the Climate Resilience Improvement Project (CRIP), to take adoptive and mitigation measures to build climate resilient infrastructure to face the adverse impacts of climate Change. Under this project, detailed flood-risk modelling, leading to the identification of structural and non-structural interventions, and measures to mitigate flood risks in 10 River Basins, including Gin Ganga and Nilwala Ganga basins will be undertaken. These interventions are currently ongoing, under the Climate Resilience Improvement

Project Phase II, which commenced in May 2016. Further efforts are being made to customize and use HMIS for flood- and drought-risk mitigation, flood and drought warning, and flood preparedness, development of data and information sharing protocols and policies with other agencies such as DMC, MASL Met Department, MCUDP/SLLR&DC, etc.

The May 2017 floods exceeded the 2003 flood (Frequency 25Yr R/T), in terms of damage caused, due to the spilling and overtopping of many bunds in Nilwala Ganga. This can be mainly attributed to the non-construction of the low dam (35 m Dam-150MCM 10yr Flood Volume for flood control only) at Pitabeddera (same site) to afford protection after routing the 100year flood through the dam and assessing the maximum flood discharge would be 962.0 m3/sec. this will be below the 10-year flood which can be mitigated by the flood levees already constructed. Ofcourse this dam cannot divert water to Hambantota as originally designed for a high dam (64 m high) with hydropower (Hulandawa -Binghamara Reservoir: 50-year Flood, cost 1968 LKR 100 mn), which was planned to be constructed as recommended in the study by the International Engineering Company (IEC), in the 1980's; and possibly due to non-construction of the bypass to protect Matara town, as recommended by the French their 1990-study.

In addition, flood-risk modelling, and the identification of flood-risk mitigation interventions in Kalu Ganga basins are being carried out with funding assistance from JICA. The outcome and recommendations from these two studies will provide the basis for long-term implementing strategy to mitigate potential damages from future flood events in Gin Ganga, Nilwala Ganga, and Kalu Ganga basins.

As of July 2017, the flood risk-mitigation investment options for Kelani basin have been firmed up at feasibility level under CRIP II. Upon clearance of the proposals, the Government expects to proceed to conduct detailed design for flood-control intervention in Kelani river basin, with the expectation to secure funding from the World Bank for the implementation of the investment plan. Feasibility-level investment options for flood-risk mitigation in Gin Ganga and Nilwala Ganga basins too, will be ready by early 2018, which will provide a basis for the Government to undertake long-term recovery. Safeguarding the Nilwala and Gin Ganga basins by taking into account the development already undertaken, has to be given priority, rather than the diversion of water to Hambantota district. This is being reviewed in the light of low availability of irrigable lands according to the current Gin Nilwala diversion studies.

In the above context, it is crucial to raise the awareness and political commitment in order to address the flood-related damages. The lack of pro-active measures to mitigate the impact of flood has led to unprecedented damage. In addition to this, the climate variability and unplanned development without adhering to proper land-use planning and building norms, and the environment degradation are some of the other factors that have attributed to the current grave situation.

6.7. IMPLEMENTATION STRATEGY FOR RECOVERY

Short Term: The responsibility for the planning, designing and execution of flood damage, rehabilitation and major improvement works, will be with the concerned Irrigation department. The irrigation Department will carry out urgent minor repairs with the budget allocated for flood damages to major Irrigation systems. Repairs to irrigation canals, where replanting of paddy is possible (seed paddy supplied by the Agriculture Department), have been identified and urgent repairs attended to, using the allocations available. Post floods, the Irrigation Department has already commenced urgent repairs to the irrigation Infrastructure.

For the execution of repairs and rehabilitation, the agencies will entrust the registered Farmer Organizations (FO), to carry out such works, under the guidance and supervision of the technical staff, and Irrigation engineers. For the execution of improvement works that require specialized skills and technical inputs, the irrigation agencies will employ skilled contractors under the technical guidance of the engineering staff.

The Commissioner of Agrarian Services confirmed that the urgent repairs to minor irrigation schemes will be handled through their District Assistant Commissioners, utilizing the technical staff available. However, if any flood damage repair and or/ structural improvement to a minor scheme require specialized technical skill, then the DAD will request the Provincial Irrigation Director (PID) to carry out such works.

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

Long Term: Discussions have commenced among, and between the agencies, to formulate an action plan to adopt 'Build Back Better" techniques, including risk mitigation measures in the restoration and modernization of major infrastructure, in order to apply for donor financial assistance.

6.8. SECTOR ASSESSMENT METHODOLOGY

This assessment was based on the data collected from national-level agencies responsible for managing major, medium and minor irrigation schemes. The ID, responsible for managing major and medium irrigation schemes has its regional offices in the Regions, headed by a Director of Irrigation, and there is a Divisional Irrigation Engineer (DIE) for each district, depending on the number of major schemes.

The damages caused by the floods on the major- /medium schemes, and flood-protection schemes are initially assessed by the DIE of the division, and subsequently these estimates are validated by the Regional Director's office, and submitted to the ID's head office in Colombo.

The damages to medium irrigation and some important minor schemes managed by the Provincial Ministries are assessed by the Divisional Engineers, and estimates are forwarded to the PID's office to obtain necessary funds through their Ministry. Similarly, damages to the minor schemes managed by the DAD, are first assessed by the Divisional officers of the Agrarian Service Centers and estimates prepared by the technical staff are forwarded to the District Assistant Commissioners for approval, who in turn apply for funding from the Ministry of Agriculture/ DAD. ■


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7. Transport

7.1. EXECUTIVE SUMMARY

The floods and landslides of May 2017 significantly affected regular land transport operations, except rail transport, in Kalutara, Galle, Matara, Hambantota and Ratnapura, districts disrupting road 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 total assessed damages and losses to the transport sector is LKR 13,076.2 million.

This assessment found that roads in all five districts of Kalutara, Galle, Matara, Hambantota and Ratnapura, were damaged due to the floods. These damages are broadly classified into (i) carriageway damages, including shoulder damages, (ii) earth slips, (iii) damages to bridges, (iv) damages to culverts and drains, and (v) erosion of river embankments. In all five districts, 898 sections of roads reported carriageway damages and earth slips. In addition, 100 bridges, 236 culverts/drains, 165 retaining walls, and 3 river embankments were also reported as damaged in these districts. Further, the flood also caused damages and revenue losses to the Southern Expressway. Overall, the estimated cost of damages for the road sector is LKR 12,841.4 million, while revenue loss for the Southern Expressway is LKR 29.4 million.

Public bus services, which operated on the damaged roads, or went under water, were interrupted during the flooding. In addition, related infrastructure including vehicles, depots and bus stands, were also damaged to a certain extent. According to the Sri Lanka Transport Board (SLTB), the report of considerable damage by the flood is to 8 buses and 2 bus depots in Ratnapura District. Both SLTB 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. The cost of damage, and revenue losses to public bus services, are estimated at LKR 3.0 million and LKR 202.2 million, respectively.

The strategy for recovery to undo the effect of damages to the road sector is to restore accessibility, connectivity and mobility, as well as to improve upon previous conditions by repairing damages with preventive measures, so as to avoid similar damage in the future. The reconstruction strategy for these roads includes short-term interventions, such as clearing of road surfaces, rectification of surface damages (by chip sealing and patching), and repairing structures and embankments. Long-term interventions include rebuilding structures – i.e. bridges, culverts, drains and retaining walls, and the protection of embankment and slopes. In addition, repairing of the traffic light system and control panels at Godagama, and the re-fencing of ROW for 80 km 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.

There was a notable loss in revenue for both SLTB and individual private operators' due to interruption of operations during the flood. However, 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; received from the government. They are also in the process of receiving funds from the Central Government for recovering the damages incurred.

The total estimated recovery-related needs for damages in the transport sector is about LKR

14,956.4 million, including LKR 14,953.1 million for roads, and LKR 3.3 million for public bus services. This amount does not include compensations for revenue loss.

7.2. PRE-DISASTER CONTEXT AND BASELINE

The road network in Sri Lanka, other than expressways, is broadly classified into national, provincial, and local roads, according to their functionality and management. While the national roads, classified as A and B class roads, are managed by the Central Government, through the Road Development Authority (RDA), the provincial roads, classified as C and D class roads, are managed by respective Provincial Councils. The expressways, classified as E Class are also managed by RDA. The local roads, which form the bottom-most layer of the road network is managed by respective Pradeshiya Sabhas, Urban Councils, and Municipal Councils. In addition, there are some roads which do not fall under any of the above classifications. The total length of such unclassified roads is very minimal, compared to the classified network. The length of the road network in the flood-affected provinces of Western, Sabargamuwa and Southern region has been summarized by type in Table 45, with a comparison to national figures.

The total length of the road network in three flood-affected provinces is 41,315 km and it makes up 35.4 percent of the national network. This can be further scrutinized to indicate shares of national, provincial and local roads in three provinces. They stand at 35.4 percent, 33.7 percent and 35.6 percent respectively. Meanwhile the full length of the country's expressway network is located within the flood-affected provinces: Western and Southern.

The transport operations of Sri Lanka are carried out by using 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, 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 are accessible by road transport modes within a maximum of 10 hours. Similarly, water transport is hardly used for either passenger or freight transportation.

Road-based land transport operations are concentrated in the 3 flood-affected provinces, though all of them are served by the railway also. The operational vehicle fleet in the flood-affect-

TABLE 45: ROAD NETWORK IN WESTERN, SABARAGAMUWA & SOUTHERN PROVINCES, 2016
SOURCE: ECONOMIC & SOCIAL STATISTICS OF SRI LANKA, 2016

Type	Sri Lanka	Western		Sabaragamuwa		Southern		All 3 Provinces	
	Length (km)	Length (km)	% to the National	Length (km)	% to the National	Length (km)	% to the National	Length (km)	% to the National
National Roads (A & B Classes)	12,210	1,594	13.1	1220	10.0	1501	12.3	4,315	35.4
Expressways (E Class)	170	110	64.7	-	-	60	35.3	170	100.0
Provincial Roads (C & D Classes)	18,900	1,954	10.3	2791	14.8	1630	8.6	6,375	33.7
Local Roads	85,500	15,000	17.5	7254	8.5	8201	9.6	30,455	35.6
TOTAL	**116,780**	**18,658**	**16.0**	**11265**	**9.6**	**11392**	**9.8**	**41,315**	**35.4**

TABLE 46: OPERATIONAL VEHICLE FLEET IN WESTERN, SABARAGAMUWA & SOUTHERN PROVINCES, 2016

Type	Sri Lanka	Western		Sabaragamuwa		Southern		All 3 Provinces	
	Nos.	Nos.	% to the National	Nos.	% to the National	Nos.	% to the National	Nos.	% to the National
Omnibuses	21,820	8,931	40.9	1,992	9.1	2,002	9.2	12,925	59.2
Private Coaches	30,878	16,258	52.7	2,527	8.2	3,505	11.4	22,290	72.2
Dual Purpose Vehicles	341,487	150,136	44.0	21,885	6.4	36,716	10.8	208,737	61.1
Private Cars	523,920	313,430	59.8	27,772	5.3	46,222	8.8	387,424	73.9
Land Vehicles	101,445	15,262	15.0	3,470	3.4	14,276	14.1	33,008	32.5
Goods Vehicles	224,571	96,483	43.0	16,882	7.5	21,844	9.7	135,209	60.2
Motor Cycles	2,250,623	681,223	30.3	125,665	5.6	325,046	14.4	1,131,934	50.3
Three Wheelers	940,838	313,182	33.3	109,016	11.6	126,055	13.4	548,253	58.3
Others	6,320	814	12.9	1,286	20.3	199	3.1	2,299	36.4
TOTAL	**4,441,902**	**1,595,719**	**35.9**	**310,495**	**7.0**	**575,865**	**13.0**	**2,482,079**	**55.9**

ed provinces of Western, Sabargamuwa and Southern are summarized in Table 46 by type, with a comparison to national figures. The total vehicle fleet in the three flood-affected provinces has been estimated at 2,482,076 million, and it accounts for slightly more than half of the national fleet. Of these only around one-third are four-wheeled or six-wheeled vehicles. The balance two-third includes two-wheeled motor cycles and three-wheeled vehicles. Buses used for public transport add up to around 13,000 units, representing about 0.5 percent of the fleet, while all forms of goods carrying vehicles, including land vehicles, make up around 168,000 units, which is only about 7 percent of the operational fleet in all three provinces. Private cars and dual-purpose vehicles are estimated at 600,000 units for all three provinces and account for 24 percent of the operational fleet. Estimated vehicle ownership is about 236 vehicles per 1,000 persons for all three provinces aggregately.

Similar to the trend in the national level, public bus service is the principal mode of passenger transport in these three provinces. These bus services are provided by the state-run SLTB and by privately-run buses, which are mostly owned by individual operators. As given in Table 46, 12,925 Omni-buses are in operation in these three provinces, and of which, only around 35 percent are owned by SLTB. Privately-owned buses are categorized as inter-provincial services and intra-provincial services, and are regulated by the Central Government through the National Transport Commission, as well as by relevant provincial councils. In addition, 188 buses are in operation on the expressways. These buses are operated by both SLTB and private operators with equal shares in number of trips.

The railway is a popular mode of transport, especially during peak hours, in Western and Southern provinces but not in Sabaragamuwa Province. The total track length ex-

tending in these three provinces is about 280 km. During peak hours, the railway operates 5-6 trains on these tracks, especially on main line and coastal lines, to provide access to and from Colombo.

7.3. POST-DISASTER EFFECTS

The floods and earth slips significantly affected regular road-based land transport operations in Kalutara District of the Western Province, Galle, Matara and Hambantota Districts of the Southern Province, and Ratnapura District of Sabaragamuwa Province, 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, 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 analysis. In this assessment damages and losses to the railway were ignored as they were insignificant.

Damages and Losses to Road Sector:

National roads: Post-disaster assessment revealed that national roads in all five districts of Kalutara, Galle, Matara, Hambantota and Ratnapura, were damaged due to the floods. These damages are classified as: (i) carriageway damages, including shoulder damages, (ii) earth slips, (iii) damages to bridges, (iv) damages to culverts and drains, and (v) erosion of river embankments in line with the classification in information sources. The extent and cost of damages by type are summarized in Table 47 (district-wise).

In all five districts, 55 roads sections of national roads were reported for carriageway damages, and another 42 sections for earth slips. In addition, 14 bridges, 20 culverts/ drains and 3 river embankments of this network were also damaged during the flood.

The total cost of the damages for national roads is estimated at LKR 6,258.8 million, out of which damages due to earth slips accounts for 51 percent, while carriageway damages account for 36 percent. Among all five districts, the national roads in Galle District have reported the highest damage amounting to LKR 2,239.4 million, whereas the least damage adding up to LKR 32.0 million was reported for Hambantota District. The national roads in Matara and Ratnapura districts have also been damaged considerably, accounting for an estimated damage value of LKR 1,662.2 million and LKR 1,523 million respectively. The cost of damages in Kalutara district is comparatively low and has been estimated at LKR 802 million.

Provincial Roads: Similar to the national roads, damages for provincial roads were also reported in all five districts and classified as: (i) carriageway damages, including shoulder damages, and earth slips (ii) damages to bridges (iii) damages to culverts and drains, and (iv) damages to retaining walls. The extent and cost of damages by type are summarized in Table 48 (district wise).

Nearly 89 sections of provincial roads were reported for carriageway damages and earth slips in all five districts. In addition, the flood has also damaged 23 bridges, 30 culverts/drains, and13 retaining walls of the provincial network in the region. The total cost of damages for these roads is estimated at LKR 3,833.1 million, and of which carriageway damages including earth slips dominate with a cost share of 91 percent. Damage cost for bridges and culverts/ drains are comparatively low and accounts for a share of 6 percent and 3 percent respectively. The provincial roads in Matara district were reported for the highest damage cost of LKR 2,729.0 million, whereas the least damage (LKR 191.2 million) was reported for Kalutara district. The network in Ratnapura district has also been damaged considerably accounting for a total of LKR 445.8 million. The cost damage for Galle and Hambantota is comparatively low

TABLE 47: DETAILS OF DAMAGES TO NATIONAL ROADS BY DISTRICTS

District	Cariageway Damage		Earth Slips		Damages to Culverts/Drains		Damages to Bridges		Erosion of Embankments		Total Damage Cost (LKR. Mn.)
	Road Sections	Cost (LKR. Mn.)	Road Sections	Cost (LKR. Mn.)	Road Sections	Cost (LKR. Mn.)	Road Sections	Cost (LKR. Mn.)	Road Sections	Cost (LKR. Mn.)	
Kalutara	5 (3 km)	124.4	3	605.0	4	21.5	1	20.0	3	31.0	801.9
Galle	19 (31 km)	1605.7	1	20.0	1	500.0	7	113.7	-	-	2,239.4
Matara	4 (14 km)	103.0	23	1529.2	-	-	1	30	-	-	1,662.2
Hambantota	14 (11 km)	14.7	-	-	5	16.5	2	0.8	-	-	32.0
Ratnapura	13 (20 km)	347.2	15	981.4	10	104.7	3	90.0	-	-	1,523.3
TOTAL	**55**	**2,195.0**	**42**	**3,135.6**	**20**	**642.7**	**14**	**254.5**	**3**	**31.0**	**6,258.8**

TABLE 48: DETAILS OF DAMAGES TO PROVINCIAL ROADS BY DISTRICTS

District	Carriageway Damage/Earth Slips		Damages to Bridges		Damages to Culverts/ Drains		Damages to Retaining Walls		Total Damage Cost (LKR. Mn.)
	Road Sections	Cost (LKR. Mn.)	No.	Cost (LKR. Mn.)	No.	Cost (LKR. Mn.)	No.	Cost (LKR. Mn.)	
Kalutara	9 (18.7 km)	63.0	6	39.0	25	68.5	13	20.7	191.2
Galle	18 (282.6 km)	229.7	-			-			229.7
Matara	32 (298.7 km)	2,620.0	2	90.0	3	19.0			2,729.0
Hambantota	16 (163.1 km)	237.4	-			-			237.4
Ratnapura	14 (309.2 km)	323.8	15	113.0	2	9.0			445.8
All Districts	89 (1072.3 km)	3,473.9	23	242.0	30	96.5	13	20.7	3,833.1

and estimated at LKR 229.7 million and LKR 237.4 million respectively.

Local Roads: The extent and cost of damages are summarized district-wise for local roads in Table 49 by following the same classification of damages adopted for provincial roads.

In all five districts, 754 sections of local roads were reported for carriageway damages and earth slips. Further, damages to 63 bridges, 198 culverts/drains and 140 retaining walls were also reported for the local road network in these five districts. The estimated total cost of damages for these roads is LKR 2,576.5 million. The cost for carriageway damages, including earth slips accounts for the highest share of 63 percent in total cost, while damages for bridges are placed second with a share of 23 percent. The reported damage cost for culverts/drains and retaining walls are comparatively low with respective cost shares of 8 percent and 6 percent.

Similar to the case with provincial roads, local roads in Matara district were again reported for the highest damage, valued at LKR 847.3 million. The network in Kalutara district has also been damaged considerably accounting for LKR 725.3 million. The cost of damages for Ratnapura and Galle are moderately placed with the values of LKR 445.4 million and LKR 355.0 million respectively. The least damage of LKR 203.5 million was reported for the local roads in Kalutara district.

TABLE 49: DETAILS OF DAMAGES TO LOCAL ROADS BY DISTRICTS

District	Carriageway Damage/ Earth Slips		Damages to Bridges		Damages to Culverts/Drains		Damages to Retaining Walls		Total Damage Cost (LKR. Mn.)
	Road Sections	Cost (LKR. Mn.)	Nos.	Cost (LKR. Mn.)	Nos.	Cost (LKR. Mn.)	Nos.	Cost (LKR. Mn.)	
Kalutara	208	604.8	11	52.2	76	45.7	71	22.6	725.3
Galle	140	355.0	-	-	-	-			355.0
Matara	157	256.5	28	505.3	75	77.5	35	8.0	847.3
Hambantota	65	153.4	-	-	22	46.8	3	3.3	203.5
Ratnapura	184	254.1	24	49.5	25	30.9	31	110.9	445.4
All Districts	**754**	**1,623.8**	**63**	**607.0**	**198**	**200.9**	**140**	**144.8**	**2,576.5**

TABLE 50: LOCATIONS, NATURE OF FLOOD DAMAGES AND ITS COST FOR SOUTHERN EXPRESSWAYS
SOURCE: ROAD DEVELOPMENT AUTHORITY

Location	Nature of Damage	Damage Cost (LKR Mn.)
Millage: 32+300	About 300m section of Expressway section was flooded for about 2 days and few alligator cracks been appeared in the section and to be sealed with type 3 slurry sealing.	0.5
Millage: 74+100 (Left)	Local failure of embankment slope for about 15m occurred during the heavy rainy period and to be sealed with a RR masonry packing.	2.5
101+500 R	Cut slope failures were observed at several locations	15
99+900 L		
Gelanigama – Welipenna	RoW fencing was damaged for about 80 km (both sides) at theses section due to flooding as well as during the flood assistance programmers	150
Kokmaduwa-Godagama (40Km × 2)		
Godagama	Traffic Light System and Control Panels at Godagama "Nilwala Gate" were damaged due to flooding.	5
Total		173

TABLE 51: NATURE OF LOSS AND ITS VALUE FOR SOUTHERN EXPRESSWAYS
SOURCE: ROAD DEVELOPMENT AUTHORITY

Nature of Loss	Revenue Loss (LKR)		
	Southern Expressway/OCH	CKE	Total
Vehicles allowed for rescue operation & food assistance for flood victims by army & other military personnel	2,861,000	35,800	2,896,800
Revenue loss due to effect of flood	25,294,000	1,258,500	26,552,500
Revenue loss due to closure of IC's		-	
Total	**28,155,000**	**1,294,300**	**29,449,300**

Expressways: Out of the three expressways in the country, only few sections of the Southern Expressway were interrupted for vehicle movements, and were damaged due to the flood. Table 50 summarizes the affected locations of the expressway, together with nature of damages and its cost.

In addition, the loss of revenue due to the closure of the flooded section on the Southern Expressway has been estimated at LKR 29.4 million. The details of these losses have been are summarized together with their monetary values in Table 51.

Damages and Losses to Public Bus Services

Public bus services which were operated on damaged roads or went under water were stopped from plying during the flooding. In addition, related infrastructure, including vehicles, depots, and bus stands were also damaged to a certain extent. According to the Sri Lanka Transport Board (SLTB), considerable damage by the flood impacted 8 buses and 2 bus depots in Ratnapura District. Both SLTB 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. The damage and revenue losses to the SLTB and Private Operators have been summarized in Table 52.

Summary table of Damages and Losses in the Transport Sector

The sectoral and sub-sectoral damages and losses for Kalutara, Galle, Matara, Hambantota

TABLE 52: DAMAGES AND LOSSES TO PUBLIC BUS TRANSPORT OPERATIONS

Service Type	District	Damages for Buses & Depots (SLTB) (LKR million)	Revenue Losses (LKR million)		
			SLTB	Private	Total
Intra – Provincial	Kalutara	-	2.9	7.4	10.3
	Galle	-	6.3	4.4	10.7
	Matara	-	1.5	8.5	10
	Hambatota	-	6.7	4.3	11
	Ratnapura	3	12.6	12	24.6
Inter-Provincial		-	14.8	59.1	73.9
Expressway Buses		-	30	31.7	61.7
TOTAL		**3**	**74.8**	**127.4**	**202.2**

TABLE 53: DAMAGES AND LOSSES TO TRANSPORT SECTOR IN AFFECTED FIVE DISTRICTS

Sector	Type	Damages (LKR million)	Revenue Losses (LKR million)	Total (LKR million)
Roads	National Roads	6,258.8	-	6,258.8
	Provincial Roads	3,833.1	-	3,833.1
	Local Roads	2,576.7	-	2,576.7
	Expressways	173.0	29.4	202.4
Public Bus Service	Intra Provincial	3.0	66.6	69.6
	Inter-Provincial	-	73.9	73.9
	Expressway Buses	-	61.7	61.7
TOTAL		**12,844.6**	**231.6**	**13,076.2**

and Ratnapura Districts, discussed above, have been summarized and presented in Table 53.

7.4. IMPACT ANALYSIS ON DEVELOPMENT GOALS

With respect to the National Road Master Plan of the RDA, the strategic goal is to be an excellent service provider with an efficient and safe road network, based on new technology. Although the recent flood has affected the road sector and public bus operations, the damages and losses are considered to be moderate when compared 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 a considerable portion of the road network has been disturbed.

7.5. CROSS-CUTTING ISSUES

The country's national road network, including expressways is considered to be a crucial economic infrastructure within the transport sector, providing high mobility, connectivity, and accessibility. Thus, early recovery of the sector is vital for the economy to be built back as it was. It is fortunate that the roads under the national road network were – in relative terms – not affected to a greater extent, because that would have, in turn, affected agriculture, and industry and commerce, as well as social sectors such as housing.

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 have proven 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, along with 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 part of its basic infrastructure by implementing appropriate counter measures in highland areas, thereby enhancing the security of the road network, and thus, safeguarding the lives of people.

7.6. RECOVERY NEEDS AND STRATEGIES

National Road Network: The strategy of recovery for the damages to the road sector aims to restore accessibility, connectivity and mobility, thus improving the previous conditions by repairing damages with preventive measures added, so as to avoid similar damage in the future. The reconstruction strategy for these roads includes short-term interventions, such as rectification of carriageway damages (rehabilitation of washed/slipped sections, and surface corrections by chip sealing, and patch-

ing surfaces), and clearing of roads. The medium-term interventions include repairing and rebuilding structures, including bridges, culverts drains, and retaining walls, and the protection of embankment and slopes. In addition, repairing of the traffic light system and control panels at Godagama, and re-fencing of ROW for 80 km of expressways, are also included, and considered short-term interventions. Essentially, the long-term developmental objectives of the sector were not affected or impacted to a larger extent, since the damages were not severe and widespread.

The financial need for recovering damages to national roads and expressways are channelled through RDA's annual budgetary allocation. RDA annually receives a separate allocation to utilize for Natural Disaster Affected Road Rehabilitation from the Central Government. In case of inadequacy of the aforementioned allocation, RDA is entitled to allocate necessary funds for disaster damages through other budgetary votes. In contrast to the financial capabilities of RDA, the PRDA and Local Governments do not receive a separate fund for spending on natural disasters. Therefore, rehabilitation in matters of disaster-related damages has to be included in the next year's road improvement program, unless a separate fund for rectifying damages is received from the Central Government. Although the flood led to revenue loss for the RDA due to the closure of some sections of the expressway, there is no defined strategy in place to recover such losses.

Public Bus Services: There was a notable loss in revenue for both SLTB and individual private operators' due to interruption of operations during the flood. However, 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. They are also in the process of receiving funds from the central government for recovering the damages incurred.

The estimated recovery-related needs for damages have been summarized by sectors and by sub-sectors in Table 54. Since proper estimates for each sector and sub sector had not been done at the time of this PDNA, the recovery-related needs for national roads and expressways have been estimated with an excess of 20 percent on their damage costs, while for provincial and local roads, an excess of 15 percent has been taken into account. The financial need for repairing damaged buses and depots has been estimated with an excess 10 percent on their damage cost.

7.7. IMPLEMENTATION STRATEGY FOR RECOVERY

RDA carries out rehabilitation of damages on national roads through its direct labour in regional offices unless extensive technical and human resource capacity is required. Similarly, RDA carries out rehabilitation of minor damag-

TABLE 54: RECOVERY NEEDS FOR TRANSPORT SECTOR IN AFFECTED FIVE DISTRICTS

Sector	Sub-sectors	Damages (LKR million)	Recovery Need (LKR million)		
			Short – Term	Medium – Term	Total
Roads	National Roads	6,258.8	5,330.6	2,043.64	7,374.2
	Provincial Roads	3833.1	3,473.9	934.17	4,408.1
	Local Roads	2576.7	1,623.8	1,339.41	2,963.2
	Expressways	173.0	173	34.60	207.6
Public Bus Service	Intra Provincial	3.0	3.3	0.00	3.3
TOTAL		**12,844.6**	**10,604.6**	**4,351.82**	**14,956.40**

es of the expressway through Expressway Operation, Management and Maintenance Division. Whenever the damages are extensive, rehabilitation work will be outsourced to a competent contractor. Such work includes rehabilitation of bridges and culverts, slope stabilization, and overlaying. Similarly, PRDA and Local Governments carry out the rehabilitation of minor damages with their in-house resources but the work is outsourced if damages are extensive.

SLTB uses their in-house mechanical labour and resources to repair damaged buses. However, rehabilitation of damaged buildings has to be outsourced due to unavailability of in-house construction labour.

7.8. ASSESSMENT METHODOLOGY

The transport sector's damage and loss assessment was primarily based on the information collected and reported by the RDA, Provincial Road Development Departments (PRDDs), Pradeshiya Sabhas, and Sri Lanka Transport Board, facilitated by the UOC research assistants. In the aftermath of a disaster, RDA gathers damage data for national roads through the executive engineer's offices, and for the expressways through Expressway operation, management and maintenance division. Similarly, PRDDs and Pradeshiya Sabhas collected data for provincial roads and local roads through their sub offices. In addition to road sector damage assessment, this PDNA strived to assess the damage and losses to public bus services operated by SLTB and Private Individual Operators. 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 it to the assessment team. Details of losses to privately-owned bus services were assessed based on the information provided by National Transport Commission, and respective passenger transport authorities. A team of research assistants from the University of Colombo facilitated data collection across agencies. ■

8. Water and Sanitation

8.1. EXECUTIVE SUMMARY

This assessment considered the damages and losses of the water and sanitation sector in five districts: Ratnapura, Kalutara, Galle, Matara and Hambantota, in alignment with the overall assessment. However, disaster impacts of water and sanitation in Hambantota and Galle were found to be far less than the other three districts. Although Colombo district was not identified as a focal district, the damages to the main transmission pipeline system from Labugama and Kalatuwawa reservoirs, which feed the Greater Colombo area was included due to its magnitude and the effect on it.

In the Water Supply subsector, the assessment focused on the disaster impacts of urban water supply schemes of National Water Supply and Drainage Board, community-managed rural water supply schemes, and dug wells. In the Sanitation sub sector, the assessment focused on household latrines.

The cost of overall damages for water and sanitation was found to be LKR 1,531.9 million, of which LKR 854.7 million was accounted for by drinking water supply alone and the remaining amount of LKR 677.2 million was for the damages to inundated toilets. The largest damage in the drinking water sector was to the community managed RWS Schemes. The total cost of losses for the drinking water sector was LKR 143.5 million; out of which, almost 66.0 million was recorded in Kalutara district. Kalutara also led in terms of financial damages and losses, accounting for 34 percent of the overall damages and losses. The overall damages and losses were lowest in Galle district.

The immediate recovery needs had already been completed, but the focus on medium- to long-term interventions with the concept of 'Build back better' found that most were long-term interventions. In the five focal districts; short-term, medium-term and long-term water and sanitation-related recovery and reconstruction needs were estimated to be LKR 8,400.1 million, LKR 5,487.7 million, and LKR 2,912.5 respectively. The highest cost was incurred for dug wells followed by toilets. Galle district has the highest need for water supply, followed by Ratnapura and Matara districts. Ratnapura and Matara district requires maximum attention when it comes to sanitation. The impact of, and recovery post a disaster vary according to the socioeconomic status of the affected population. More deprived communities find that their basic needs are further compromised, whilst the more affluent ones remain concerned about the recovery of capital cost of the damaged water and sanitation-related assets.

When planning water and sanitation services, repeated and recurrent occurrence of disasters in recent years, emphasize the need to take into account the very significant impacts, particularly on most vulnerable groups such as children, adolescent girls, elders, mothers and differently abled people. It also clearly highlights the need for robust medium- to long-term strategies for the sector, so that it becomes significantly resilient to disasters. These include interventions in building necessary capacity in human resources, and developing system protocols with multi-stakeholder approaches with disaster risk management internalized in the planning function. The strategies will span inter-institutional structural realignment from the macro level to community aspects at the grassroots level.

8.2. PRE-DISASTER CONTEXT AND BASELINE

Geographical Focus

The PDNA assessment of the water and sanitation sector considered the five districts with 60 Divisional Secretary areas, and 1472 Grama Niladhari Divisions, in alignment with the

broader study. The impact on the water and sanitation infrastructure of Matara district was highest in comparison to the more undulating Ratnapura district. Kalutara district closely followed these two districts. The disaster recovery needs of the Matara and Kalutara districts posed different problems, particularly concerning stagnation and inundation of water over a longer period of time.

Water Supply

The public health dimension necessitates that the water sub-sector pays the greatest attention to drinking water, when accessibility to potable water, in order to cater to the most basic human needs, is compromised. Nationally, the public relies mainly on the following modalities to fulfil their domestic water needs, resulting in the assessment being limited to the analysis of:

i. Pipe-borne water supply of the National Water Supply and Drainage Board (NWS&DB);

ii. Pipe-borne water supply by Community-based Rural Water Supply Schemes; and

iii. Shallow Dug wells (household and common).

The NWSDB caters to approximately 37 percent of Sri Lanka's total drinking water supply and 79 percent of pipe-borne water supply. Mainly conventional treatment processes are employed by the 324 water supply schemes that rely on primarily surface-water sources. The NWSDB, which is considered as one of the best water utilities in the South Asia region, services at a consistent quality through its 2,092,471 service connections.

Rural Water Supply schemes, numbering approximately 4500, are mostly community-managed and cover approximately 10 percent of Sri Lanka's total water supply, and represent 21 percent of the total pipe-borne water supply. These schemes are managed by persons with basic knowledge of operations and maintenance. The quality and quantity of water supplied are often inconsistent.

The largest contribution to Sri Lanka's drinking water supply, with a coverage of 48 percent — amounting to almost half of its population — is by shallow dug wells. Individual householders, often for domestic use, construct most of these wells. Dug wells are mainly categorized as protected, and unprotected, depending on the availability of a guard wall and/or an apron around it. Regardless of the type of well, there is no consistent water quality; and dug well owners are often advised to use an appropriate household water treatment method, such as boiling drinking water, or adding chlorine tablets, to address microbial risks. Both Ratnapura and Matara districts have comparatively higher percentages of unimproved water sources.

BNWS&DB, and CBO-managed RWS schemes, as well as protected dug wells, are categorized as 'improved water' sources, while unprotected wells and other sources are categorized as 'unimproved water' sources. The percentage coverage of 'improved water' sources in the five focal districts is shown in 55 below.

Sanitation

In the absence of pipe-borne sewer networks, and seepage treatment plants in the geographic area of the assessment, the Sanitation sub-sector analysis was mainly based on household latrines, with a particular focus on both access to, and disposal of, excreta. Ratnapura and Hambanthota districts have higher percentages of unimproved sanitation systems. Table 56 below, summarizes the sanitation coverage (access) percentage in each of the focal districts.

Water and Sanitation Infrastructure Baselines

Water Supply

Data from National Census of Population & Housing (2012) on water, as well as current op-

TABLE 55: DRINKING WATER COVERAGE PERCENTAGE IN FOCAL DISTRICTS
SOURCE AND CALCULATION BASE: CENSUS OF POPULATION & HOUSING- 2012

District	Dug Wells (%)			National Pipe Network (%)			Other Sources (%)					Improved water %	Unimproved water %
	Protected wells within premises	Protected wells outside premises	Unprotected wells	Tap within the unit	Tap within the premises but outside the unit	Tap outside premises	Rural water supply projects	Tube Wells	Bowser Supply	Bottled Water	River/Tank/Stream/ Spring and others		
Galle	43.1	14.6	7.5	20	5.2	2.3	3	1.1	0.1	0	2.8	89.7	10.4
Matara	32	12.4	6.7	22	7.7	1.7	10	0.8	0	0	7.0	86.3	13.7
Hambanthota	12	7.5	2.4	25	26.7	4.8	15.7	2.3	0.3	0.1	3.2	94.1	5.9
Ratnapura	17.7	13.2	5.2	10	8.4	4.5	26.2	1.5	0.4	0	12.9	81.6	18.5
Kalutara	45.9	13.4	4.6	20.4	2.8	1.6	6.8	2.2	0.2	0	1.9	93.1	6.7

TABLE 56: SANITATION COVERAGE PERCENTAGE IN FOCAL DISTRICTS
SOURCE AND CALCULATION BASE: CENSUS OF POPULATION & HOUSING- 2012

District	Within the housing unit (%)		Outside the housing unit (%)		Other (%)			Improved Sanitation %	Un-improved Sanitation %
	Dedicated to Household	Shared	Dedicated to Household	Shared	Shared with other housing units	Common/ Public	Not using latrine		
Galle	30.7	2.1	58.7	5.6	2.3	0.2	0.4	89.4	10.6
Matara	23.6	1.8	66.6	5.2	2.4	0.3	0.2	90.2	9.9
Hambanthota	14.8	1.4	73.2	6.8	3.2	0.1	0.4	88.0	12.0
Ratnapura	20.8	2.1	65.8	7.5	3.0	0.2	0.5	86.6	13.4
Kalutara	42.5	2.2	48.4	4.9	1.6	0.2	0.2	90.9	9.1

erational data from the NWS&DB, DNCWS and WaSSIP, were used in deriving baseline information for the pre-disaster context in the five focal districts, under the selected categories, as shown in tables 57 and 58.

In Hambanthota district, NWS&DB provides potable water to almost 54 percent of the population, while it is almost 39 percent in Matara district. The dug wells provide drinking water to 60 percent of the population in Galle district, while the community-managed RWS Schemes provides 60 percent of population's water-related needs in Ratnapura district. In Kalutara district, 67 percent of the population gets water from dug wells.

Sanitation

Data from National Census of Population & Housing (2012), on sanitation, were used in deriving the baseline information for the pre-disaster context in the five focal districts under the selected categories, as shown in Table 59 and Table 60 below. This analysis mainly fo-

TABLE 57: PIPE BORNE WATER AND DUG WELLS – BASELINE DATA IN FOCAL DISTRICTS
SOURCE AND CALCULATION BASE: CENSUS OF POPULATION & HOUSING- 2012

District	Number of Pipe Borne Water Supply Systems		Number of Dug Wells					
	NWS&DB SCHEMES SOURCE – NWS&DB	*RWS/COMMUNITY MANAGED SCHEMES SOURCE NWS&DB/DNCWS/ WASSIP*	Protected wells within premises	Protected wells outside premises	Unprotected wells	Total Protected Wells	Total Un-protected Wells	Total Wells
Galle	15	164	116,245	39,304	20,207	155,549	20,207	175,756
Matara	17	355	65,245	25,365	13,690	90,610	13,690	104,300
Hambanthota	20	149	18,679	11,587	3,754	30,266	3,754	34,020
Ratnapura	12	450	49,538	36,958	14,506	86,496	14,506	101,002
Kalutara	5	163	138,011	40,288	13,942	178,299	13,942	192,241
Total	**69**	**1281**	**387,718**	**153,502**	**66,099**	**541,220**	**66,099**	**607,319**

TABLE 58: POPULATION SERVED BY PIPE BORNE WATER AND DUG WELLS – BASELINE DATA IN FOCAL DISTRICTS
SOURCE AND CALCULATION BASE: NWSDB, DNCWS, WASSIP, CENSUS OF POPULATION & HOUSING- 2012 AND DISTRICT STATISTICAL HANDBOOK

District	Population Served by Pipe Borne Water Supply Systems				Population Served by Dug Wells					
	NWS&DB Schemes		RWS/Community Managed Schemes		Protected wells within premises	Protected wells outside premises	Unprotected wells	Total Protected Wells	Total Un-protected Wells	Total Wells
	No. Of Service Connections	Population Served	No. Of Service Connections	Population Served						
Galle	107,248	408,615	7,531	28,693	442,893	149,748	76,989	592,642	76,989	669,631
Matara	95,861	383,444	44,099	175,336	260,980	101,460	54,760	362,440	54,760	417,200
H'thota	103,836	399,769	52,759	203,515	71,914	44,610	14,453	116,524	14,453	130,977
Ratnapura	49,159	181,888	221,100	818,070	183,291	136,745	53,672	320,035	53,672	373,707
Kalutara	74,388	238,042	16,371	65,982	441,635	128,922	44,614	570,557	44,614	615,171
Total	**430,492**	**1,611,757**	**341,860**	**1,291,596**	**1,400,713**	**561,484**	**244,488**	**1,962,198**	**244,488**	**2,206,686**

TABLE 59: HOUSEHOLD TOILET BASELINE DATA IN FOCAL DISTRICTS
SOURCE AND CALCULATION BASE: CENSUS OF POPULATION & HOUSING- 2012

District	Number of Toilets								
	Individual Household Toilets		Shared Toilets (assuming two households sharing one toilet)		Shared Toilets (assuming two households sharing one toilet)		Total Individual Household Toilets	Total Shared Toilets	Total Toilets
	Within House	Outside House	Within House	Outside House	Outside House	Public Toilets			
Galle	82914	158460	5645	15061	6084	568	241374	27358	268732
Matara	48101	135934	3681	10704	4838	534	184035	19757	203792
Hambanthota	23057	113754	2182	10618	4981	107	136811	17888	154699
Ratnapura	58261	184632	5864	21086	8526	680	242893	36156	279049
Kalutara	57109	140521	3306	11091	4939	369	197630	19705	217335

TABLE 60: NUMBER OF LATRINES BY TYPE AND DISPOSAL SYSTEM IN FOCAL DISTRICTS
SOURCE AND CALCULATION BASE: CENSUS OF POPULATION & HOUSING- 2012

District	Households	Type of Latrine utilized by households (Numbers)					
	Total	Water sealed & connected to a Pit	Water sealed & connected to Septic Tank	Pour Flush latrine (Not Water Sealed)	Direct pit	Other	Not using Latrine
Galle	273, 140	257,657	5,917	4,296	4,123	108	1,039
Hambanthota	156, 476	145,252	1,904	1,736	6,836	120	628
Kalutara	305,737	292,195	6,638	3,284	2,710	123	787
Matara	206,790	196,953	4,565	1,788	2,991	56	437
Ratnapura	285,893	255,587	12,250	4,775	11,490	142	1,650

cused on household latrines (both non-shared and shared), with on-site excreta disposal systems, such as septic tanks and/or soakage pits, standalone pits, and cesspools.

Approximately 95 percent of the household latrines in all the selected focal districts, except Ratnapura (90%) are water sealed, and connected to a pit. Although this is laudable, there is still a proportion of the population that is utilizing unsanitary methods of disposal of excreta. Pour flush latrines (not water sealed), direct pits and not using a latrine at all, lead to soil contamination, and has significant long-term effects to groundwater resources. (Table 59, 60)

Ratnapura and Hambantota districts have a comparatively higher percentage of households utilizing unsanitary methods, amounting to around 6 percent. Although utilizing septic tanks is a better alternative, when compared to the above-mentioned unsanitary methods, a majority of these are structurally weak, and not connected to soakage pits, as required for appropriate treatment.

The lack of comprehensive and updated data on the type of excreta-disposal methods used by households, and especially the quality of construction of septic tanks, are the primary limitations, when it comes to the development of a new and improved system, to enhance the

resilience of the local communities to future hazards. In addition, the challenge also lies in determining the quality of concealed septic tanks. Furthermore, the main concern is the lack of resources and capacity constraints to gather and analyse existing data on latrines.

8.3. POST-DISASTER EFFECTS

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

NWS&DB Water Schemes

NWS&DB water-supply schemes in these areas were affected due to adverse weather conditions, including flooding, and operations had to be suspended under some schemes. While there was some damage to water schemes due to flooding, there was noticeable interruption of services in Matara district to almost 95 percent of all NWSDB consumers. Interruptions in Ratnapura and Hambanthota districts were mainly due to disruption of one large system in each district, affecting 18 percent and 15 percent of the consumers respectively. Galle and Kalutara districts' consumers were the least affected.

Three major transmission pipelines conveying water to Kaduwela and Colombo city were damaged due to the landslide that occurred along Kaluaggala-Labugama Road at Thummodara. Almost 100m of the road section was washed down along with these transmission pipelines. Water supply could be restored within a short period of time by re-routing water from other systems. However, road repairs are still in progress, and the pipelines can only be repaired after the road is restored.

The description of damages to the NWSDB systems in the focal districts, and the affected number of consumers are indicated in Table 61 below.

The total number of consumers affected from this disaster is almost 29 percent of all the baseline NWS&DB consumers in the focal districts. It is evident that most of the damages reported, were to the water intakes built along rivers and streams, and associated equipment. Borehole intakes were also damaged due to inundation. In addition, floods had destabilised the distribution networks of several schemes. Due to the unavailability of power supply along with the inundation of generators; some systems could not be restored immediately after the floods. Table 61 below does not include the many intakes blocked with debris due to the flood, and subsequently cleaned, and restored without damages.

As soon as the disaster struck, the NWS&DB initiated the Emergency Response Planning system. It also utilised its regular and additional resources to minimize service interruptions to affected people in all districts, even going beyond its regular services and functioning, as an entity providing technical expertise. Some critical equipment and the entire standby equipment stocks were removed to safer locations; resulting in minimisation of damages and losses. In addition to the regular NWSDB hotline, in Matara district, special telephone numbers were assigned for 24/7 operation, to provide information and assistance to the affected communities.

Regular consumers who could not get access to services due to the floods were provided with alternative means to access water. Water supply to essential institutions such as hospitals, temporary shelters, and rescue operation centres, were maintained in an uninterrupted manner. In addition, water supply schemes where the infrastructure was unaffected, but the surrounding areas flooded, were monitored closely and

TABLE 61: DESCRIPTION OF DAMAGES TO THE NWS&DB SYSTEMS IN THE FOCAL DISTRICTS
SOURCE: NWSDB

District	Water supply scheme	Description of Damages		Affected number of consumers
		Intake structures and Equipment	Other Structures	
Galle	Pitigala	Boreholes and pumps		1,448
	Udugama	Boreholes, pumps and panels		686
Matara	Matara Group	VSD Panels and Generator		340,860
	Karagoda- Uyangoda	Boreholes and panels		9,200
	Akuressa	Pumps and panels		8,500
	Deniyaya	Panels		3,880
	Makandura	Pumps and boreholes		1,260
H'thota	Ranna		Pipelines and a bridge crossing	46,200
	Wakamulla	Pumps and panels	Slow sand filters	12,705
Ratnapura	Ratnapura	Generator		32,560
Kalutara	Ingiriya		Gravity transmission mains	4,288
	Horana		Distribution mains	960
Colombo	Greater Colombo Water Production		Three (03) Main Transmission Pipelines damaged due to a landslide.	---
Total Number of NWSDB Consumers Affected				462,547

allowed to operate; which enabled water to be supplied through bowsers.

Immediate recovery and cleaning efforts managed to restore the functionality of all vulnerable schemes. In some locations, especially in Matara district, the response teams could not be mobilized until roads became accessible. Temporary water supply, with the help of water trucking, and temporary storage facilities, were provided to cater to the increased water demand of both displaced and regular consumers, and also for domestic cleaning after flooding. The assistance provided by District and Divisional Secretaries, DMC, armed forces, UNICEF, and other donors, was noteworthy. NWS&DB also provided water to the military and others involved in the rescue and cleaning operations of households inundated by floods, using water trucks.

The heavy rains resulted in increased dissolved solids and microbial pollutants in all surface-water sources requiring NWS&DB to invest in more resources on turbidity removal, disinfection, and in some locations for taste/odour removal– in their conventional treatment plants and the distribution systems. Deploying more water-quality testing teams to the affected areas further strengthened the water quality surveillance systems.

The floods compromised the NWS&DB's routine revenue since the flood-affected urban communities were offered an extended timeframe for monthly bill settlement, considering the extensive use of water for cleaning households. Further, concessions were granted for water losses due to damages to the internal plumbing systems and fixtures; these were assessed on a case-by-case basis.

Support from external agencies to the NWS&DB's emergency response and recovery was largely supply-based, and covered material and service costs. The operational and staff costs were borne by NWS&DB; along with voluntary inputs from the staff from unaffected districts. Even though additional resources were mobilized, the large number of leaks in small localized water distribution systems, and the inability to detect them until the receding of floods, significantly increased the water losses.

The NWSDB had been implementing the 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. The respective WSPs of affected systems now have to be reviewed, risk re-assessed, with new control measures and improvement plans developed to avert potential risks from future unprecedented flood levels. Based on these plans, NWSDB then has to address medium and long-term needs, including strengthening the resilience of their water intakes, structures, and equipment.

There is also a need to further improve NWSDB's Emergency Response Planning and disaster response/recovery processes, based on the current experiences.

Community-Managed Rural Water Schemes

Due to the large number of community-based RWS systems; especially in Ratnapura and Matara districts; the damages have been scattered and extensive. It has been a challenge to monitor and assess the condition of RWS schemes after the disaster. The scattered nature of the infrastructure, along with the still-emerging institutional mechanisms, has also resulted in difficulties in gathering accurate data.

The initiative to collect data of the affected community-based RWS systems was made by the Water Supply and Sanitation Improvement Project (WaSSIP), with the assistance of both the Department of National Community Water Supply (DNCWS), and Rural Water Supply (RWS) district units of NWS&DB. Since each scheme is unique with its own community-based operation, most of the post-disaster issues had been managed by the community, leaving only the more critical issues for external analysis and support. Based on the information gathered, the affected number of community-based RWS systems in focal districts is given in Table 62.

A substantial number of systems have been affected, and the percentages are high in Matara and Galle districts; while the lowest-affected districts are Kalutara and Hambanthota. The damages include destructions to intakes, pumps, treatment units, structures, and pipelines.

TABLE 62: AFFECTED NUMBER OF COMMUNITY BASED RWS SYSTEMS IN FOCAL DISTRICTS
SOURCE: WASSIP, DNCWS & NWSDB RWS UNITS

District	Affected RWS/Community Water Schemes	Total RWS/Community Water Schemes	% Affected
Galle	57	164	35
Matara	110	355	31
Hambanthota	12	149	8
Ratnapura	56	450	12
Kalutara	10	163	6
Total	**245**	**1,281**	**19**

Close to 83 percent of the consumers in community-based RWS systems in Matara districts were distressed while the percentage was 42 in Galle. Consumers in Hambanthota and Ratnapura were the least distressed.

It is important that the Rural WSPs are developed and implemented in all RWS systems which contribute to enhancing the resilience of these schemes, and empowering communities to manage risks better. Initiatives in this regard have been started by WaSSIP, Water safety Plan Advisory Unit and RWS section of NWSDB and DNCWS, with technical and financial support from WHO, UNICEF, and World Bank. (Table 62)

Dug Wells

The most commonly used source of water in the country – dug wells – have been the most affected by the floods as the damages have been significant. Both protected and unprotected dug wells immediately become unusable after flooding, due to inundation of water, which carries debris and pollutants, including microbial, chemical and physical pollutants. In cases of protected wells, severe floods, in most cases, destabilize the guard walls and aprons, compromising safety when accessing them. Wells, largely being personal domestic property and prevailing in very high numbers, rarely get assessed in an in-depth manner for damages, following a disaster. The authorities offer standard well-cleaning equipment, and support, in batches, to make the wells serviceable as early as possible. The issue however is the lack of accurate data as indicated in the recent assessment. Medical Officers of the MoH, and Public Health Inspectors (PHIs) were the first line of support in making the wells serviceable – mainly in the technical coordination of dewatering and shock chlorination activities. 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 offered their support in this effort.

Rehabilitation of damaged protected wells, as well as provision for basic infrastructure to unprotected wells, remains a major need. This infrastructure (guard wall, apron and internal lining) mainly makes wells more secure, and limits physical contamination to some extent. However, it does not assure water safety against microbial or chemical contamination, thereby requiring the need for public health promotional activities on household storage and treatment. The WaSSIP, together with NWSDB, has initiated the WSP's concept for point sources including dug wells, as a WASH promotion activity, and will be piloted in the disaster-affected Ratnapura district soon.

As indicated in Table 63 below, most of the affected dug wells are in Kalutara district while the highest percentage is from Ratnapura district. The least disturbed area in terms of affected wells is Hambanthota district.

TABLE 63: NUMBER OF AFFECTED DUG WELLS IN FOCAL DISTRICTS
SOURCE: NWSDB, DNCWS, WASSIP & DMC

District	Total Number of Dug Wells	Affected number of dug wells	% of Affected wells
Galle	175,756	7,202	4.1
Matara	10,4300	3,991	3.8
Hambanthota	34,020	166	0.5
Ratnapura	101,002	7,056	7.0
Kalutara	192,241	11,264	5.9
Total	**607,319**	**29,679**	**4.9**

TABLE 64: NUMBER OF AFFECTED TOILETS IN FOCAL DISTRICTS
SOURCE: UNOPS

District	Total Number of Toilets	Affected number of Toilets	% of Affected Toilets
Galle	268,732	1,188	0.4
Matara	203,792	1,792	0.9
Hambanthota	154,699	3,628	2.3
Ratnapura	279,049	2,416	0.9
Kalutara	217,335	3,272	1.5
Total	**1.123,607**	**12,296**	**1.1**

Kalutara and Ratnapura district dug wells' users were the most affected, while Hambanthota's users were the least affected.

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) being channelled 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 completed 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 properly designed, are structurally weak, and not water sealed; similar to a standalone soakage pit /cesspool. Data to exactly determine the numbers 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 groundwater pollution, with live pathogenscausing immediate risk to dug-well users.

Since inundated septic tanks are not given priority during the immediate-response phase, the stabilization of the ones that are structurally weakened remains both a recovery, and long-term need. There is a need to replace damaged septic tanks in the most vulnerable households. This exercise needs to be mainstreamed, both as a public health intervention and resilience-building priority.

Water and sanitation facilities in schools were of concern during the disaster, for two reasons. Some facilities which had suffered damages and losses (mentioned in the Education sector), were put into service during emergency response — schools were the first option to house temporarily-displaced and evacuated communities. Hence the quality, quantity, as well as child- and disabled-persons-sensitivity of school water supply and sanitation-related facilities became much more apparent. Therefore, they need to be taken into account during recovery and reconstruction by the respective sectors/stakeholders. The number of affected toilets and the respective percentages in the focal districts are given in Table 64. The highest number of affected toilets is in Hambanthota district, followed by Kalutara and Ratnapura districts. These include fully- and partially-damaged toilets.

In Matara district, 22 percent of toilet users were affected, while it was 19 percent in Ratnapura district. The least effected was Hambanthota district. (Table 70)

Summary of Damages and Losses

Water Supply – Damages and Losses

Water-supply system damages have been largely documented, and therefore, could be reasonably derived. The damages to household dug wells had not been documented by any government authority, and direct data is unavailable. However, the number of dug wells affected, and subsequently cleaned, was obtained through the DMC, from District and Divisional Secretariats. These data only include the number of wells, and do not distinguish between protected and un-protected wells. Estimates for the damages to dug wells were made by UNOPS, based on collected-field data through a survey.

Accordingly, the infrastructure statistics used for costing and analysis of damages and losses associated with the disaster are summarized in Table 65 below.

The respective populations affected by the different water systems in the focal districts are given in Table 66 below. According to the above data, the people in Matara district were the worst affected in terms of drinking water supply, followed by Ratnapura and Hambanthota.

Table 67 below presents the percentage of affected population, by systems, in focal districts.

Estimation of Damages to Water Supply

A very high percentage of NWS&DB and community-based RWS systems in Matara district were affected by the disaster, while a high percentage of dug well users were affected in Kalutara and Ratnapura districts. Table 68, and Table 69 below, summarise the damages and losses in the focal districts under the water subsector in line with the pre- and post-disaster context described above.

Estimation of Losses to Water Supply

The losses in NWSDB schemes include the loss of revenue and costs for temporary/alternative water supply arrangements. The costs for alternative water supply by NWSDB include, services to consumers affected by community-based RWS systems, as well as dug well users. Since bowser supply is a coordinated effort of many stakeholders, the actual costs' details could not be obtained from all of them. (Table 69)

The losses in community-managed RWS schemes were managed by themselves, and in Galle district some immediate pipe requirements were provided by NWS&DB.

The following assumptions were made in estimating losses pertaining to household dug wells:

- All wells were cleaned with basic dewatering and / or shock chlorination
- Cost of cleaning of a dug well was assumed as LKR 6,000.00

Damages to Sanitation

The damages to household latrines have not been documented by any government authority, hence direct data is unavailable. The damages have been estimated by UNOPS, based on collected field data. (Table 70, 71)

8.4. IMPACT ANALYSIS ON DEVELOPMENT GOALS

Prior to the disaster, the water sector was moving towards water safety based on WSPs– as a key initiative in-line with the Sustainable Development Goals (SDGs)- by establishing surveillance of water supply; from the catchment to the consumer. The aftermath of the disaster highlighted the need for WSPs, at both the level of the service provider, and of the household. Post-disaster actions have the potential of sustaining the water safety agenda, with particular attention on emergency response planning, and disaster-risk reduction in catchments and river basins, through a multi-stakeholder management mechanism. It also highlights the need to improve the Emergency Preparedness and Re-

TABLE 65: INFRASTRUCTURE STATISTICS USED FOR COSTING DAMAGES, LOSSES AND NEEDS FOR DRINKING WATER

SOURCE: NWSDB, DNCWS, WASSIP, DMC & UNOPS

District	NWS&DB Water Schemes	RWS/ Community Water Schemes	Affected number of wells	Cleaned number of wells
Galle	2	57	7,202	7,202
Matara	5	110	3,991	3,338
Hambanthota	2	12	166	166
Ratnapura	1	56	7,056	1,468
Kalutara	2	10	11,264	10,981
Colombo	1	-	-	-
Total	**13**	**245**	**29,679**	**23,155**

TABLE 66: POPULATION AFFECTED BY DIFFERENT DRINKING WATER SYSTEMS IN FOCAL DISTRICTS

SOURCE: NWSDB, DNCWS, WASSIP & DMC

District	NWS&DB Water Schemes		RWS/ Community Water Schemes		Population Affected by Damaged Dug Wells	Total Affected Population in District	Total Population in District (Main Report Table 4)	Affected Population %
	Number of Service Connections	Population	Number of Service Connections	Population				
Galle	560	2,134	3,052	12,026	26,317	40,476	1,063,334	3.8
Matara	90,925	363,700	37,715	145,838	15,672	525,210	814,048	64.5
Hambanthota	15,300	58,905	1,715	6,605	642	66,152	599,903	11.0
Ratnapura	8,800	32,560	10,539	39,601	26,663	98,824	1,088,007	9.1
Kalutara	1,640	5,248	2,231	7,917	46,182	59,347	1,221,948	4.9
Total	**117,225**	**462,547**	**55,252**	**211,987**	**115,476**	**790,010**	**4,787,240**	**16.5**

TABLE 67: PERCENTAGE OF AFFECTED POPULATION BY DRINKING WATER SYSTEMS IN FOCAL DISTRICTS

SOURCE: NWSDB, DNCWS, WASSIP & DMC

District	NWS&DB Water Schemes	Community Based RWS Schemes	Dug Wells
	% Affected population	% Affected population	% Affected population
Galle	0.5	41.9	3.9
Matara	94.9	83.2	3.8
Hambanthota	14.7	3.2	0.5
Ratnapura	17.9	4.8	7.1
Kalutara	2.2	12.0	7.5
Total	**28.7**	**16.4**	**5.2**

TABLE 68: COST OF DAMAGES TO WATER SUPPLY INFRASTRUCTURE IN FOCAL DISTRICTS
SOURCE: NWSDB, DNCWS, WASSIP, DMC & UNOPS

District	NWS&DB Water Schemes (LKR.)	Community managed RWS Schemes (LKR.)	Dug Wells (LKR.)	District Total (LKR.)
Galle	11,000,000.00	54,148,709.00	5,575,000.00	70,723,709.00
Matara	72,000,000.00	109,485,000.00	42,905,000.00	224,390,000.00
Hambanthota	55,000,000.00	25,543,743.00	14,515,000.00	95,058,743.00
Ratnapura	10,000,000.00	242,268,853.00	44,415,000.00	296,683,853.00
Kalutara	1,700,000.00	10,800,000.00	85,320,000.00	97,820,000.00
Colombo	70,000,000.00	---	---	70,000,000.00
Total	**219,700,000.00**	**442,246,305.00**	**192,730,000.00**	**854,676,305.00**
Total Cost of Damages (LKR.)				**854,676,305.00**

sponse capacity and mechanism for NWS&DB to better manage such situations. Similar needs have emerged in community managed RWS schemes. Furthermore, the damages to dug wells have highlighted the need to increase public knowledge, and change attitudes and practices on water safety in general and household water-treatment options in particular.

The gaps in knowledge, technology and system, related to excreta management, particularly at the domestic level, identified after the floods, can contribute towards the formulation of proper guidelines and stakeholder accountability. In order to maintain the momentum towards achieving the country's sanitation goals, the country will need to focus on a development strategy that will strengthen the sanitation sector from a long-term resilience point of view, after fully understanding the root causes to the current system's failure. The recent natural disasters have exposed the vulnerabilities in the Sanitation subsector, where systems and facilities at household levels have failed, thereby exacerbating the situation of the most vulnerable communities. The floods have destroyed household sanitation facilities, such as latrines available in households, causing much inconvenience to dwellers. Therefore, standard on-site sanitation will be made available for all those who cannot connect to the sewerage system. Furthermore, the country is formulating a National Sanitation Policy, which focuses on environmentally – friendly sanitation, and will guide the development course towards achieving the Agenda 2030 commitments.

TABLE 69: COST OF LOSSES TO WATER SUPPLY INFRASTRUCTURE IN FOCAL DISTRICTS
SOURCE: NWSDB, DNCWS, WASSIP & DMC

District	NWS&DB Water Schemes (LKR.)	Community Water Schemes (LKR.)	Cleaning of Dug Wells (LKR.)	District Total (LKR.)
Galle	538,959.25	600,000.00	43,212,000.00	44,350,959.25
Matara	1,758,950.28	0.00	20,028,000.00	21,786,950.28
Hambanthota	800,000.00	0.00	996,000.00	1,796,000.00
Ratnapura	800,000.00	0.00	8,808,000.00	9,608,000.00
Kalutara	64,481.58	0.00	65,886,000.00	65,950,481.58
Total	**3,962,391.11**	**600,000.00**	**138,930,000.00**	**143,492,391.11**
Total Cost of Losses (LKR.)				**143,492,391.11**

TABLE 70: ESTIMATED DAMAGE TO TOILETS AND ESTIMATED AFFECTED POPULATION
SOURCE: UNOPS

District	Population			Damages (No. of Toilets)		
	Total Population	Affected Population	Affected Population%	Fully damaged toilets	Partially damaged toilets	Total Damages
Galle	1,063,334	102,747	10%	261	927	1,188
Hambanthota	559,903	9,301	2%	956	836	1,792
Kalutara	1,221,948	187,883	15%	1,935	1,693	3,628
Matara	814,048	176,975	22%	1,282	1,134	2,416
Ratnapura	1,088,007	206,496	19%	1,745	1,527	3,272

TABLE 71: COST OF DAMAGES TO SANITATION INFRASTRUCTURE IN FOCAL DISTRICTS
SOURCE: UNOPS

Districts	Cost of damages of fully damaged toilets (LKR.)	Cost of damages of partially damaged toilets (LKR.)	Total cost of damages per district (LKR.)
Galle	18,270,000.00	37,080,000.00	55,350,000.00
Hambanthota	66,920,000.00	33,440,000.00	100,360,000.00
Kalutara	135,450,000.00	67,720,000.00	203,170,000.00
Matara	89,740,000.00	45,360,000.00	135,100,000.00
Ratnapura	122,150,000.00	61,080,000.00	183,230,000.00
Total cost of damages			677,210,000.00

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 due to the lack of privacy and dignity in such circumstances.

Overall, the disaster has triggered renewed thinking amongst relevant stakeholders on improved strategies for service delivery and operational workflows in times of a disaster, particularly given the public's 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, it should be reflected in the budget and human resource allocated within the sector, as well as at the household level.

8.5. CROSS-CUTTING ISSUES

Environment

Both the floods and landslides have clearly raised the profile of Integrated Water Resource Management, as well as Catchment/ Watershed 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 seepage management at the local authority level is evident together with required infrastructure for disposal and transport facilities. 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, particularly in more densely-populated areas. Most importantly, the scenario has highlighted the need for systematic coordination, defined accountabilities and convergence between water, sanitation, health, local governance, and environment sectors' 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. Access to disabled persons to public buildings and sanitation facilities is considered good practice, and should be encouraged particularly in buildings in disaster-prone areas that can serve as potential temporary shelters.

Gender

Gender-segregated sanitation facilities have become a norm in Sri Lanka. However, stronger focus on gender considerations need to be made when providing water and bathing facilities, as well as menstrual hygiene management, during emergency response because they have implications on the security and safety of women and children. Particularly, the needs of lactating mothers and pregnant women, 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-related 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 recognized as an investment and long-term saving options. 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.

8.6. RECOVERY AND RECONSTRUCTION STRATEGY

Context-Specific Approaches

The recent disaster clearly highlighted different caseloads of affected communities that need customized water and sanitation strategies as summarized in Table 72.

Multi Sectorial 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.

Sector Coordination

Disaster Risk Management (encompassing pre-, onset and post-emergency context) and Emergency Preparedness, and Response Capacity/ Mechanism, should become permanent agenda items 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 by forming multi-sectorial platforms to materialize long-

TABLE 72: PROPOSED STRATEGIES AND STRATEGIC TIMEFRAME

Strategic Timeframe	Target Caseload of Affected Population	Proposed Strategies	Present Position
Short to medium term	Urban/Rural population whose water systems had been damaged	Investing in repair and reconstruction programs	Included in Short Term Recovery & Reconstruction Needs (Table 18 & 19)
	Urban/rural population whose septic tanks had been damaged	Using precast septic tank technology	Included in Medium-Term Recovery & Reconstruction Needs (Table 18 & 20)
	Population whose dug wells have been damaged	Investing in repair and reconstruction programs	Included in Short Term Recovery & Reconstruction Needs (Table 18 & 19)
Medium to long term	Urban/rural population with water from a piped network Rural population with water from a dug well	Improving the capacity of field water quality testing	Programs are being implemented and funds secured.
		Improving mobile repair and restoring capacity of piped water	Programs are being implemented and funds secured.
		Field testing child, disabled and gender sensitive permanent infrastructure designs	Design work is in progress.
		Building emergency preparedness and response capacity in services	Programs are being implemented and funds secured.
		Improving DRR aspects of infrastructure and services making them resilient to predicted disasters	Programs are being implemented and funds secured.
		Empowering the emergency response capacity within Water Safety Plans	Programs are being implemented and funds secured.
		Enhancing the septate management capacity of local authorities	Pilot programs implemented in seven districts.
Long term	Population living within catchments, river basins and sensitive reservations	Mainstreaming integrated water resource management with special attention to disaster risk reduction	Pilot programs implemented in seven districts.
		Mainstreaming land use planning	Integrated into planning and feasibility study manuals of NWSDB.
		Promoting awareness on environmental sustainability	Programs are being implemented and funds secured.
		Upgrading the school curriculum with the basics of water safety, environmental sanitation and environmental sustainability	Pilot programs implemented in seven districts.

term strategies for Integrated Water Resource Management, with attention to catchments, and river basins. Convergence between the 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

The recovery and reconstruction needs were calculated based on the estimated damages to water and sanitation infrastructure. An improvement cost of 10 percent (following the 'Build Back Better' principle) was built into the estimated damages for medium-term and long-term water and sanitation recovery, and reconstruction costs.

The total recovery and reconstruction costs for water supply and sanitation facilities in the five focal districts are indicated in Table 73 below. The highest cost is for dug wells followed by toilets.

Table 74 below represents the Water Supply Recovery and Reconstruction Needs by Districts. Galle district has the highest need, followed by Ratnapura and Matara districts.

8.7. IMPLEMENTATION STRATEGY FOR RECOVERY

The Ministry of City Planning and Water Supply, together with NWS&DB and DNCWS; being the sector involved 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 the 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 and NWSDB will collaborate with the international donor community, and UN agencies, in the recovery/ reconstruction process. They will further link the recovery and reconstruction work with long term development and DRR initiatives pertaining to the sector.

The sector will focus specifically on the coordination and institutionalization between policy and implementation levels during the recovery phase, particularly involving the grass root level such as CBOs. The sector assessments will 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 CBOs, communities, civil society organizations, media institutions, etc. The sector will assess the incorporation of such stakeholders in medium to long-term recovery processes as well, by setting mechanisms and platforms. The existing Community-Based Organizations that manage water schemes will play a key role in this aspect, through capacity building and integration of risk-management approaches such as water safety plans. The sector will have to assess its potential in reaching out to both upstream and downstream audiences through customized communication strategies on risk-informed and disaster-resilient water and sanitation services. Mass media and education systems will 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 recovery. While short-term monitoring has been successful, there will be challenges in medium- and long-term monitoring, since the sector services are delivered by both mandated and non-mandated services providers, including individual households. The sector's coordination mechanism will consider these dynamics in monitoring.

The sector will consider innovation, research, and development as key cross-cutting aspects across water and sanitation services, to make them more disaster resilient. This will 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, traditional indigenous knowledge on withstanding disaster will be revisited.

8.8. ASSESSMENT METHODOLOGY

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

Damages to Water Supply

Damages to NWS&DB water schemes were based on site visits to the locations, and assessments made by the respective provincial and regional offices. The initiative to collect data of affected community-based RWS systems was made by the Water Supply and Sanitation Improvement Project (WaSSIP), with the as-

TABLE 73: SHORT TERM, MEDIUM TERM AND LONG-TERM WATER & SANITATION RECOVERY AND RECONSTRUCTION NEEDS

Sub Category	Water & Sanitation Recovery and Reconstruction Needs (LKR.)			
	Short Term	Medium Term	Long Term	Total
NWS&DB Water Schemes	73,700,000.00	183,600,000.00	--	257,300,000.00
Community managed RWS Schemes	--	486,470,935.50	--	486,470,935.50
Dug Wells	--	212,003,000.00	4,531,884,500.00	4,743,887,500.00
Toilets	--	744,931,000.00	2,167,550,000.00	2,912,481,000.00
Total	**73,700,000.00**	**1,627,004,935.50**	**6,699,434,500.00**	**8,400,139,435.50**

TABLE 74: SHORT TERM, MEDIUM TERM AND LONG-TERM WATER SUPPLY RECOVERY AND RECONSTRUCTION NEEDS BY DISTRICTS

District	Water Supply (LKR.)			Total for Districts (LKR.)
	Short Term	Medium Term	Long Term	
Galle	1,000,000.00	76,696,079.90	1,388,244,000.00	1,465,940,079.90
Matara	1,000,000.00	245,729,000.00	890,675,500.00	1,137,404,500.00
Hambanthota	0.00	104,564,617.30	258,687,000.00	363,251,617.30
Ratnapura	0.00	326,352,238.30	1,028,456,000.00	1,354,808,238.30
Kalutara	1,700,000.00	105,732,000.00	965,822,000.00	1,073,254,000.00
Colombo	70,000,000.00	23,000,000.00		93,000,000.00
Total	**73,700,000.00**	**882,073,935.50**	**4,531,884,500.00**	**5,487,658,435.50**

TABLE 75: MEDIUM-TERM AND LONG-TERM SANITATION RECOVERY AND RECONSTRUCTION NEEDS BY DISTRICTS

District	Toilets (LKR.)		Total for Districts (LKR.)
	Medium Term	Long Term	
Galle	60,885,000.00	317,471,000.00	378,356,000.00
Matara	148,610,000.00	230,307,000.00	378,917,000.00
Hambanthota	110,396,000.00	526,372,000.00	636,768,000.00
Ratnapura	201,553,000.00	884,730,000.00	1,086,283,000.00
Kalutara	223,487,000.00	208,670,000.00	432,157,000.00
Total	**744,931,000.00**	**2,167,550,000.00**	**2,912,481,000.00**

sistance of both the Department of National Community Water Supply (DNCWS), and Rural Water Supply (RWS) district units of NWS&DB.

The UNOPS had made estimates for the damages to dug wells in Galle and Matara districts based on collected field data through a survey.

- Fully-damaged wells = 0.6% of protected wells
- Partially-damaged wells = 0.24% of protected wells

Data for the other districts have been assumed using the above percentage of damaged dug wells for Galle and Matara districts.

The following assumptions were made in estimating damages to household dug wells:

- Reconstruction of fully-damaged protected wells – LKR. 65,000.00 per well
- Repairing of partially-damaged protected wells – LKR. 35,000.00 per well
- Protection for unprotected wells – LKR. 65,000.00 per well

Damages to Sanitation

It must also be noted that the primary reason for utilizing unsanitary methods (especially not using latrines) are financial constraints of the rural population. The damages to latrines (accessibility) are often apparent, while damages to excreta-disposal systems (mainly septic tanks and soakage pits) remain concealed leading to both short-term and long-term hazards.

The damages in Galle and Matara districts have been estimated by UNOPS, based on collected field data. Data for the other districts have been calculated extrapolating the percentage of damaged latrines for Matara which is 0.64 percent.

The following assumptions were made in estimating damages to toilets:

- Reconstruction of fully damaged toilet – LKR. 70,000.00 per toilet
- Repairing of partially damaged toilet – LKR. 40,000.00 per toilet
- Construction of water sealed toilet for direct pit users – LKR. 70,000.00

Recovery and Reconstruction Needs

The medium-term and long-term recovery and reconstruction needs were calculated by including an improvement cost of 10 percent on the estimated damages to water and sanitation infrastructure. ■

9. Power supply

9.1. EXECUTIVE SUMMARY

The objectives of the PDNA in relation to the Power Sector, is to assess and quantify the extent of damage and revenue loss caused by the disaster, and to gain a better knowledge on the recovery needs of the power sector, to ensure a resilient-rebuilding process.

The net value of the damage and losses in the power sector was estimated to be LKR 652.45 Million. Damages to the infrastructure has been estimated at LKR 474.31 million, and the total revenue loss as recorded, is LKR 178.15 million across the five disaster-affected districts in the country. Mainly, the electricity distribution network in five districts (Ratnapura, Galle, Matara, Hambantota and Kalutara) was damaged by severe floods and landslides. Within the five districts, the highest number of damages was recorded in Matara — particularly in the Kotapola DS Division. Serious damages were recorded in Kalawana, Ayagama, and Kalutara as well.

Power supply was disconnected in order to avoid electrocutions and was restored in most of the affected areas between days 3 and 10, depending on the accessibility. The damage and loss for the power sector have been calculated based on the data collected and provided by the field staff of Ceylon Electricity Board (CEB), and Lanka Electricity Company (LECO).

The recovery strategy for the power sector aims to restore power supply immediately, improving the previous conditions by repairing damages with some preventive measures to avoid similar damages in the future. The total estimate of the recovery and reconstruction need for the power sector is LKR 2.1 billion. This includes medium- and long-term recovery initiatives that require reducing the impact of damage for the sector concerning environmental and social effects in order to make the power supply system in the country resilient to future disasters and climate risks.

9.2. PRE-DISASTER CONTEXT AND BASELINE

The governance and administration of the power sector comes under the Ministry of Power and Renewable Energy. Ceylon Electricity Board (CEB) is a 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. Lanka Electricity Company (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.

In order to achieve benchmark competition to improve efficiency and quality of supply to the customers, and sound operation mechanism, the Distribution System of CEB is divided into four Divisions. The CEB's distribution network consists of 30,611 km of 33 kV, 11 kV Medium-Voltage lines (MV), and 138,514 km of 400 V Low Voltage (LV) lines adsorbing power from 63 Grid Substations (GSS). There are 6.6 million electricity consumers in the country.

Each Distribution Division of CEB is headed by an Additional General Manager who is directly reports to the General Manager of CEB. The four divisions have been formed in the following Provinces. (Table 76)

Each Distribution Division is divided into provinces and each Province is headed by a Deputy General Manager. The Province is sub-divided into several Areas, which are managed by Area Electrical Engineers. The Area is further subdivided into several Consumer Service Centres (CSC) headed by an Electrical Superintendent.

TABLE 76: DISTRIBUTION DIVISION OF CEB

Division 1	Colombo City, North Western Province, North Central Province and Northern Province
Division 2	Western Province North, Central Province and Eastern Province
Division 3	Western Province South II, Uva and Sabaragamuwa
Division 4	Western Province South I and Southern Province

There are two branch offices of LECO in Galle and Kalutara, to carry out the electricity distribution operations, headed by a Branch Manager who directly reports to the Head of Operations in LECO.

The present electrification level of the whole county is 99.3 percent and 100 percent electricity accessibility was achieved in 2016. Almost all the households (100%) in the Southern Province are supplied electricity by the National Grid. The distribution system of the Southern Province is comprised of 3,639km of 33 kV lines, 248.50 km of 11 kV lines and 20,584km of LT lines, deliver electricity to the doorsteps of 739,937 electricity consumers. There are six grid substations (GSS) in the Southern Province catering to the distribution system.

The distribution network of Sabaragamuwa Province is comprised of 2,976 km of 33 kV lines, 26.6 km of 11 kV line and 13,266 km of LT lines catered by 3 GSS. The number of consumers with access to electricity in Ratnapura district is 82,500 out of the total of 463,302 consumers in Sabaragamuwa Province. Both CEB and LECO operations are carried out in Kalutara district for supplying electricity to 133,406 households in the district. The distribution system of Kalutara consists of 848.2 km of 33 kV lines and 3,459 km of LV lines.

9.3. POST-DISASTER EFFECTS

The electricity distribution system suffered physical damage during the floods and landslides, disrupting power supply in Kalutara, Ratnapura, Matara, Hambantota and Galle in the Southern Province, between the May 25 and June 5. The highest number of electricity-related damages was recorded in Kotapola Divisional Secretariat Division, Matara District. Damage to the distribution system in Matara district was the highest when compared with other affected districts in the Southern Province. Nearly 330,000 electricity consumers were affected by disconnection in the Southern Province.

Electricity supply was restored and normalized between days 2 and 10 in Matara, Pitabeddara, Baddegama, Neluwa, Athyraliya, and other mostly-affected Divisional Secretaries' Divisions, especially in Matara and Galle, depending on both severity and accessibility. CEB could restore power supply in Hambantota district within 4 days.

Ratnapura town, Elapatha, Kiriella, Ayagama, Kalawana, Nivithigala and Eheliyagoda were the most affected divisions in Ratnapura district. Kalawana and Ayagama CEB Deports were completely inundated due to floods. Electricity Distribution feeders, which cater to all above areas, were switched off on May 26, 2017. However, electricity supply to Ratnapura hospital was provided without any interruption. 143,371 electricity consumers were disconnected from the electrical grid due to the impact of floods. Approximately one week was taken to restore the power supply in Kalawana and Ayagama areas.

Power supply was disconnected in affected areas in Kalutara district from May 26 to the first week of June 2017, affecting nearly 79,000

consumers. When the water level was rising, transformers were isolated and almost all transformers had to be disconnected in mostly-affected areas, while maintaining power supply to Kalutara Hospital and the Police station, along with the Divisional Secretariat. Power supply to Water Pumping Stations at Labugama/Kalatuwawa was delayed by two days due to the earthslip situation at Thummodara. Hence, water supply was affected in Colombo District. CEB could normalize connections between days 3 and 10 in most of the areas in Kalutara, based on the principle of accessibility.

Special Restoration Gangs of CEB were in operation to restore the power supply. The transportation of materials such as poles and cables were hampered due to non-availability of road access.

The physical damage to the electricity distribution system was estimated to be LKR 426 million. Mainly, bulk-supply energy meters, current transformers, MCCB's (moulded case circuit breakers), distribution lines, electricity poles (both low tension and medium voltage), MCCB cut outs and normal energy meters were damaged. Matara Grid Substation was completely inundated and totally disconnected due to flooding, and alternative power supply was arranged through Galle, Beliatta and Deniyaya Grid Substation in the Southern Province. The cost of damages to the Matara GSS was estimated to be LKR 48.49 million.

As part of emergency operations of the CEB, electricity isolations were carried out to avoid casualties and damages due to electrocutions. The field situation was closely monitored and acted upon accordingly. Tri-armed forces, the police, and government institutions, also helped in numerous ways. Weather reports were used to monitor and assess the ground situation.

The total damage and losses occurred to the power supply sector was LKR 652.46 million. Physical damages to electricity infrastructure were estimated to stand at LKR 474.31 million, out of which LKR 474 million worth damages were incurred to CEB-owned infrastructure, and LKR 0.31 million in damage to LECO. Losses (the revenue losses) of the electricity sector have been estimated at LKR 178 million. Losses were higher in CEB when compared to the losses in LECO areas.

Summary table of estimates of Damage and loss
(Table 77)

9.4. IMPACT ANALYSIS ON DEVELOPMENT GOALS

Electricity is the prime means of energy to all social interfaces such as hospitals, armed forces, water supply mechanisms, government and private institutions, religious institutions, fuel pumping stations and business places, etc. One of the development goals of the Ministry

TABLE 77: SUMMARY TABLE OF ESTIMATES OF DAMAGE AND LOSS

Disaster Effects	Assumption/ Comments	LKR Million		
		CEB	LECO	Total
Infrastructure & assets recovery		474	0.31	474.31
Disruption in service delivery/Losses		178	0.15	178.15
Total		**652**	**0.46**	
Grand Total				**652.46**

of Power & Renewable Energy is to provide electricity to all at all times. The disruption of the supply was kept at its minimal for 2 to 10 days in the most-affected areas in the Southern province, Ratnapura and Kalutara districts, depending on the severity of the damage and accessibility. Recovery took a considerable time to restore normalcy even after the water level subsided in some places, which were fully submerged.

Some damages caused to the Mini Hydro Developers were reported. The revenue generated from bulk-electricity customers and ordinary consumers was directly affected. The bulk supply given to factories was also restored soon after the flood disaster, but workers took several additional days to attend duties as living conditions were not fully harmonized.

9.5. CROSS-CUTTING ISSUES

The administration of the post-disaster situation was not seriously hampered as all logistics were handled in a timely manner, supervised by senior officers, and monitored by relevant authorities. Assistance given by voluntary representatives, peer groups, and the management, made the task more effective. All relevant staff in the sectors worked as teams to help the affected people.

No specific groups in particular can be categorized as vulnerable. People living in the low-lying areas were mostly affected. Those with low incomes couldn't resume their normal lives because of the other related issues.

CEB took the initiative to clear the debris of the electrical network to avoid electrocutions and educated residents about possible impacts. The deployment of CEB Working Gangs to affected areas to clear the damaged power cables and lines was difficult due to unavailability of necessary transport (boat) facilities, especially in Ratnapura District.

Considering the increasing number of landslides (35 related to this event), the environmental impact of the mini-hydro schemes requires to be reviewed. As stated in the Environment chapter, construction affects soil and slope stability while cutting and uprooting valuable tree species and diversion of water have implications on possible the extinction of indigenous species of fauna and flora. This impact should be taken into account when planning and installing future Power Sector Plans.

9.6. RECOVERY NEEDS AND STRATEGIES

In the immediate aftermath of the May 2017 disasters, 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 hrs. The damages caused to the power distribution lines and other installations have been fully restored at this point, and thus, a specific recovery and reconstruction strategy will not be required.

However, the Ministry of Power and Renewable Energy facilitated CEB to upgrade the Transmission and Distribution Network through the implementation of a number of Transmission and Distribution Development projects to ensure the reliability, and the quality of power supply, concerning environmental and social effects, in order to make the power supply system in the country resilient to future disasters and climate risks.

The CEB has experienced an island-wide blackout in 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 a Plan for the 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

TABLE 78: TOTAL RECOVERY NEEDS OF POWER SUPPLY

Recovery Needs	Costs (LKR Million)		
	Short Term	Medium Term	Long Term
Infrastructure & assets recovery Identified backup materials of mostly-needed items for restoration of electrical supply, such as Energy Meters, Poles, MCCBs etc.		469	
Service delivery/ Production of goods & Services Maintain stores at convenient and at vicinity for quick transportation.		10	
Portable Generators with fuel storage for ongoing needs/ Social needs.		4	
Solar-powered Lamps/Lanterns for life support.		3	
Solar-powered Chargers for operational/ social needs		7	
Radio Communication System/ PTT (Push to Talk) enabled hand-held radios for operational activities (30 Systems).		3	
Motorized Boats with lifesaving Jackets for material and workers transports (3 Boats).		5	
Risk and Vulnerability reduction Capacity Building of the Power Sector's employees on Disaster Risk Reduction Disaster Management Strategies.			5
Appointing a Disaster Management Team for the Power Sector			
Establish Disaster preparedness and Disaster Management and desk/Office at the Provincial Control Centre/Call center of Ceylon Electricity Board.			1
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
Installation of Rain Gauging stations in Catchment areas with telemetering system to obtain real-time data.			5
Conversion of bare conductor to ABC Conductor.			1,000
Shifting of Auto Reclose at Morawaka.		3	
MV line shifting at river banks and river crossing.			150
Re-conducting MV lines for alternative power arrangements.			200
Shifting of Kalawana and Kiriella CEB Depots.			13
Overhead and Contingency		50	142
Total		**554**	**1,566**

recommendations provided by the Committee, which include setting up of a disaster preparedness plan, setting up of a disaster management committee, and building the capacity of the staff. It is expected that the above arrangements will strengthen the CEB's capacity to respond to future disasters.

A smart distribution network with underground cabling and a sophisticated monitoring system is a must for reliable distribution system. The Ministry decided to install rain-gauging stations in catchment areas with telemetering system to obtain real-time data in order to respond accordingly.

- **Pre-disaster planning**

The System Control Centre of CEB studies the weather patterns and weather forecast, and also considers the announcement of water level in preparation of its 'preparedness plan'. CEB's area offices and breakdown gangs are informed accordingly to act in case of a disaster.

The implementation of the Disaster Management Plan for the Power Sector was initiated by the Ministry of Power and Renewable Energy with the collaboration of the Ministry of Disaster Management, and the Disaster Management Centre.

Recovery and Reconstruction Initiatives and Costs
(Table 78)

9.7. IMPLEMENTATION STRATEGY FOR RECOVERY

The disaster situation was monitored daily, and a special contact number was announced for the public to inform about any electricity grievances. Special teams to respond to all needs in the sector were deployed and they responded as urgently as possible. Financial authority 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 minimize electrical property damage which could have popped up after connecting (future oriented) the supply.

Two utility providers, CEB and LECO, are responsible for the implementation of recovery and reconstruction strategies with respect to distribution network damages. The Ministry of Power and Renewable Energy is facilitating the two utility providers by formulating energy policies to implement an effective recovery mechanism, and the coordination of donors, for securing finances for future development, and upgrading of the present distribution network. The Distribution Master Plan, which is under preparation with JICA's assistance, will be initiated to ensure a coordinated approach for generation and transmission.

The Ministry of Power and Renewable Energy initiated concessions for electricity consumers who have been severely affected by the flood and landslides in the following ways: Electricity meters have been provided free of charge to those whose meters have been destroyed in the floods. CEB also initiated clearance to the internal wiring network by inspecting the same for those who have been affected. Six months' grace period has been given for flood victims when it comes to paying their May and June electricity bills in instalments. Free service connection is being given to consumers whose houses have been completely destroyed by the floods and landslides, and payment of previous electricity bills has been waved off. Free electricity service is being offered for a six-month period for people displaced due to floods and landslides. Affected small enterprises and industries are being given six months to pay due electricity bills on an instalment basis.

9.8. ASSESSMENT METHODOLOGY

Data was collected by the Divisional Secretariat Divisions and forwarded to the CEB Distribution Divisional Office. Data and information on the electricity distribution network was assessed by the Area Engineering Offices of CEB. The need to restore supply was raised by the area office of CEB and administrated by the main Distribution Divisional offices of CEB covering the island. Loss and damage data of LECO distribution areas were also collocated by the LECO area office and compiled at the LECO head office.

Revenue loss was calculated on a prorated basis: The average monthly bill for a calendar month for many days (basically 10 days) of loss of power was considered. Average losses of LKR 500 household were taken into consideration. Standard costs were published and used for arriving at replacement costs. Finally, market rates as of today have been considered with tolerance. ■

SECTOR REPORTS

CROSS CUTTING ISSUES

10. Environment

10.1. EXECUTIVE SUMMARY

Recurrent and multiple disasters in Sri Lanka have made the country highly vulnerable and paying for losses that the country cannot afford. While climate change may be responsible for intensified hazards, Sri Lanka cannot hold climate change responsible for all the impacts of the disasters. Contemporary development that ignores environmental concerns is gradually eroding the country's natural resource base, which acts as an effective buffer between people and natural hazards, to disaster-related risks.

Increasing Sri Lanka's exposure to Disasters in 2016 and 2017 can be easily attributed to being largely development induced, although as mentioned above, high rainfall within a short period of time was a hazard which was most likely a result of climate change. Yet developmental impact on environment, contributed significantly to the way the hazard impacted people. Weakened water retention capacities of the Sinharaja and allied rainforests, due to the destabilization of the ground, deforestation, degradation of forests, 'development' activities including mini-hydro schemes, etc., disappearance/inability to perform ecosystems' service functions of river banks due to its widespread unauthorized encroachment by government offices, private-sector property and settlements violating reservation-related regulations, destabilization of embankments due to indiscriminate and over extraction of river sand, etc., are some links which PDNA identified that aggravated risks and intensified impact. Lack of effective waste-management system, contradictory developmental directives, etc., and weak governance systems which are not able to enforce environment laws, are seen as some of the key institutional reasons which exposed both people and assets in the affected areas to the disaster, and as such, resulted in heavy damages and losses in May 2017.

The environment chapter argues that Sri Lanka has little choice left but to shift towards sustainable development as the other alternative is to continue paying dearly with increased loss of lives and losses to the economy. Alternative investment and development plans possibly will be more resource intensive, but are needed for resilient and more balanced development. This underpins the need to empower institutions to enforce environment al governance. In the short and medium run, it is important to review and find a way out of some of the burning concerns such as, sand mining, controversial pesticide use, potential of proposed mini hydro potential schemes, and urban waste management, while the long-term sustainable development plans of Sri Lanka are developed and implemented.

Assessing damages to environment and related losses is difficult and recovery, which generally takes longer, is even more so, but the striking lack of data and information about damages to natural capital makes the task impossible. Major landslides caused losses worth LKR 541 million loss of ecosystem services. This calculation was possible due to comprehensive data compiled by the NBRO. Information on ecological damages as a result of floods could not be found and therefore, has not been estimated. This clearly re-emphasizes the need for a systematic collection of post-disaster environment data and information, as recommended by the PDNA 2016 as well. The increasing disaster trend, which has links to environmental management, makes this even more important.

The evidence needed for minimizing environmental destruction and reasoning of additional investment required for environmentally-sensitive solutions, can only be justified through systematic collection and analysis of environment-related data and information. Recovery principles call for 'Build Back Better' and the analysis of environmental data can also justify the additional resources needed for sustainable recovery programmes. While lack of data and

information prevents the derivation of accurate recovery estimates of the environment sector, the chapter provides an approximate cost of LKR 300 million for planning and putting into place urgent measures for recovery and reconstruction with regard to environmental destruction in the short term, while a minimum of LKR 530 million is needed to facilitate recommended transformations in the long term.

10.2. PRE-DISASTER CONTEXT AND BASELINE

The relationship between environment and disaster resilience

Sri Lanka, although located in the disaster hotspot South Asian region,[40] until about a decade ago was considered to be a country with relatively low disasters risk. Nevertheless, recent events and trends put in evidence of the increasing vulnerability, particularly to climate related hazards. Extreme weather events such as floods/landslides and droughts, have become the new norm in Sri Lanka. As high winds and rainfall were creating havoc in the Southern, South-Western and South-Central parts of the country in May 2017, the North, the North Central, Eastern and the North-Western regions continued to suffer from severe drought and water shortage that has been continuing for over one and a half years.

A sound link between the increasing frequency and intensity of disasters, and climate change, has now been established. It is also quite well established that the majority of risks and vulnerabilities that people face have environmental precedence; in natural or built environments. As the PDNA 2016 reported, the combination of heavy rainfall, favourable geology and inappropriate land-use practices are some of the key factors for further aggravating the climate vulnerability of the country to trigger increased risk of landslides in the central hills over the last few years. Footprints of recent and often accelerated 'development' that had not taken environmental concerns into due consideration, and risks aggravated by serious gaps in environmental governance could be clearly identified in the affected areas.

40. Independent 2015, http://www.independent.co.uk/news/world/asia/south-asias-most-deadly-earthquakes-a6709301.html

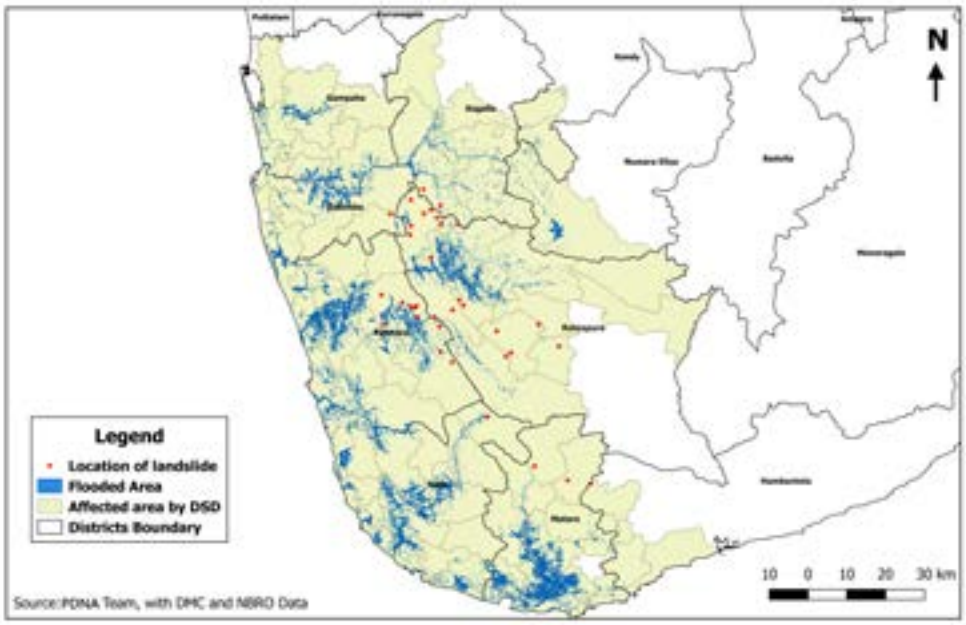

FIGURE 18: AFFECTED DS DIVISIONS BY FLOODS AND LANDSLIDES 2017

Status of environment and natural resources

As the PDNA 2016 mentioned, the ecosystem service capacity of forests in Sri Lanka, is fast declining. Sinharaja, the most valuable rainforest of Sri Lanka; a World Biosphere Reserve since 1978 and a World Heritage Site since 1988,[41] and the surrounding unprotected rainforests, contain the origins of rivers that contributed to the 2017 floods. These forests continue to face challenges of destruction to their rich bio-diversity. Following the recognition of the important role of forests in climate change through the REDD+ initiative, the government of Sri Lanka implemented the REDD+ readiness (Reducing Emissions from Deforestation and Forest Degradation + readiness) programme over the last four years, which concluded with an investment framework at an estimated cost of approximately US$ 100 million to combat deforestation and forest degradation.[42] Yet the pressure on the forest by developmental initiatives by the Government and other stakeholders continues. Encroachments, infrastructure development projects, and private agriculture ventures are identified as the main drivers of deforestation. Forest fires are also a local risk that forests face. While forest fires can be due to accidents or extremely dry weather, most fires reported are due to encroachment of forest for cultivation of tea or other crops or by poachers targeting wildlife. E.g., more than 150 acres of Handapan Ella within the Rakwana rainforest area had been completely destroyed in early 2016 by fire,[43] worsening, deforestation and aiding the destruction of catchment areas.

Figure 19 shows the main drivers and processes affecting the environment and contributing to the increasing risks. These elements will be described in the text below.

The reduction in the ability of soil to hold water in rainforests, facilitating the runoff and siltation of streams and waterways, are considered immediate impacts of forest degradation. Communities, civil societies and local officials in disaster-affected areas identified illegal extraction of forest resources and clearance given for various projects ignoring environmental protection laws and related construction, logging and plantation of tea, palm oil, etc., as well as construction of mini hydro schemes,[44] as key reasons of creation of risk, which continue despite recurrent disasters.

Regardless of advocacy campaigns aimed at convincing decision makers to rethink the logic of promoting mini-hydro schemes, which generate relatively small amounts of electricity at a high cost of losing the extremely valuable environmental services of rainforests, licenses are continued to be issued for these schemes. Out of total 519 mini-hydro energy projects proposed, 182 energy projects commissioned generate a total of about 355 MW[45] of electricity. There are about 40 mini-hydro schemes in the affected area: Ethamala Ella (2MW), Koskulana (0.6 MW), Anda Dola (0.77 MW) and Eli Hatha (2 MW) are a few examples. The movement and use of heavy machinery destabilize soil and slope, while cutting and uprooting valuable species of trees lead to the diversion of water, with implications such as the extinction of indigenous species of fauna and flora.[46] Impacts of construction spread way beyond just the site (e.g., expanding foot paths to roads that allow the passage of heavy vehicles). Drying up of natural springs and waterfalls, have been observed

41. http://www.colombopage.com/archive_11A/Sep10_1315632233KA.php
42. UNREDD+ Programme Sri Lanka 2015, Drivers of Deforestation and Forest Degradation in Sri Lanka; Identification of Key Policies and Measures
43. https://rainforestprotectors.wordpress.com/2016/04/23/handapan-ella-forest-reserve-set-on-fire/
44. http://www.rainforestprotectors.org/rainforest/documents/Campaigns/2015/Protect%20Sinharaja%20World%20Heritage%20Rainforest.pdf
45. SLSEA records 2017
46. http://www.liveat7.lk/2016/01/19/12768/

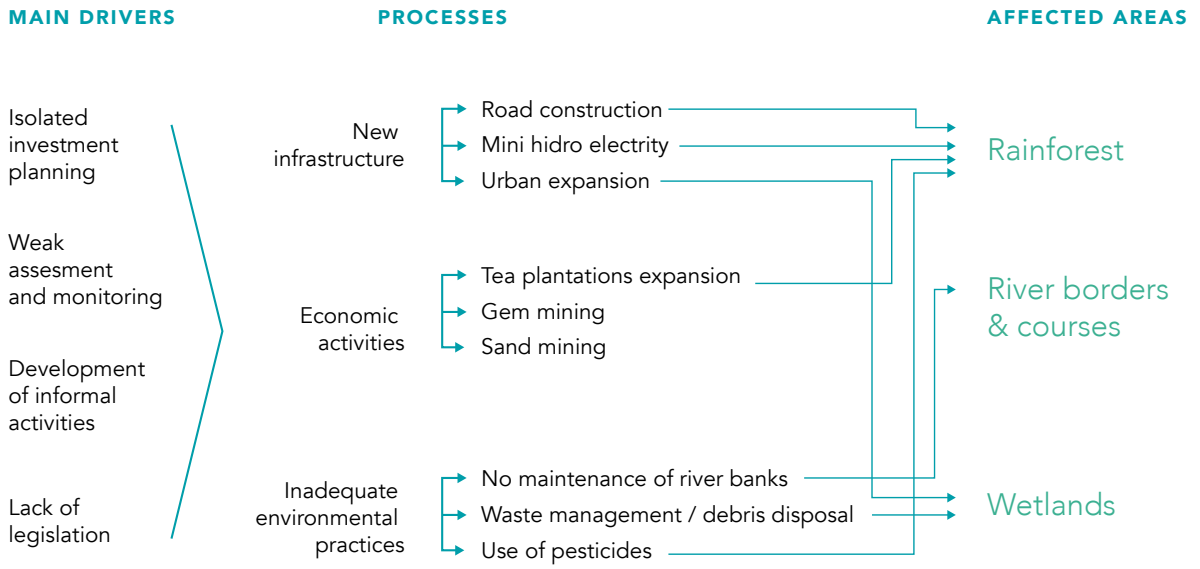

FIGURE 19: RISK RELATED ENVIRONMENTAL PROBLEMS IN AFFECTED AREAS

as a result. There are allegations regarding the destruction of rainforests and/or buffer zone due to schemes that have come up with the patronage of politicians and officials. The accusation also extends to not having proper EIA and/or not implementing recommendations of EIA. Even when EIAs are respected, due to its project-specific focus, the cumulative impact created by all or clusters of projects, are not known. Neither the approving government authorities nor independent organizations in Sri Lanka have resources to monitor project implementation; therefore, ecological damage arising from these developments are not captured and compared.[47]

When mini-hydro schemes were introduced about three decades ago as a renewable energy option to be promoted through private investment, their viability index assessed by a plant factor which was about 42%. Some experts claim that mini-hydro resources in Sri Lanka by now have been exhausted. In addition to declined water availability due to climate change and other reasons, the plant factor has drastically declined to about 30%. Review of the Government's position on mini-hydro schemes, and declaring an end to mini hydro-schemes have been discussed. In this context, why Sri Lanka plans to add 155 MW of electricity from mini-hydro schemes during 2018-2037[48] is a question, and it needs to be discussed widely, especially when other renewable options continue to become more viable. The wind potential of Sri Lanka, with the opening of the North and East, is quite substantial. The potential assessed so far just in the Mannar-Poonarin stretch alone is over 700 MW[49], while the full potential is believed to be much higher. Solar potential is also very high in Sri Lanka for obvious reasons, although there are some technical and practical challenges that – must be overcome to harness and mainstream a substantial portion of that potential.

A proposal of road construction through the Sinharaja rainforest, creating risks to flora and

47. https://rainforestprotectors.wordpress.com/2016/02/12/environmental-impact-due-to-destruction-of-rainforests-for-mini-hydro-projects/

48. PUCSL 2017, Decision on Least Cost Long Term Generation Plan 2018-2037,

49. Records from SLSEA

PHOTOGRAPHS FROM KOSKILUNA AND ANDADOLA MINI-HYDRO PROJECTS

FIGURE 20: MINI-HYDRO PROJECTS
SOURCE: RAINFOREST PROTECTORS OF SRI LANKA

fauna/wildlife, and unnecessarily exposing the World Heritage forest, was suspended due to protests in 2011. Investigations ordered by the Minister of Environment, recommended building an alternative road outside the protected area to meet the same needs. Immediate actions to acquire 2,500 hectares of Sinharaja World Heritage Rainforest under the Land Reforms Commission (LRC) were recommended under Forest Conservation Department, [50] endorsing the Cabinet Directive of 2004.

As the PDNA of 2016 points out, wildlife and nature have been given increased importance as Sri Lanka strategizes tourism as a key growth sector. However, increased human elephant conflict will result in destruction to natural habitats. Ill-planned development, recurrent floods, landslides and extended periods of droughts, and the spread of invasive species, continue to be increasingly challenging. Therefore, it is doubtful if the country will be able to realise its ecotourism potential within time if increased threats to forest and wildlife as well as the threat of disaster-related risks to people living downstream from rainforests are not adequately addressed.

Landslide-related risks that lead to the increase in deaths and destruction have been discussed at length NBRO has mapped the risks related to landslides in affected districts and categorised them under safe, unsafe, and medium safe areas, and offered guidance for construction and living in areas with lower risks. Approval from the Local Authority for construction of houses and structures in non-taxpaying local authority has not been respected. As such, NBRO recommendations are not known to them or monitored. People believe that apart from the negative impact of large projects, individual actions such as uprooting of old rubber trees for change in plantation or land use, constructing roads and other service infrastructure for privately-owned land, and construction within the private land without adhering to NBRO guideline in areas with higher elevation, also significantly contribute to landslide risks. There is a strong view from Ratnapura that unregulated and unsystematic gem mining has created significant landslide threats. They say[51] that there are many areas of the district such as palmadulla, which are areas 'on stilts' or on gem mines and are at risk of collapse; disasters waiting to happen.

About a third of the wetlands in the country, which plays a vital role in flood retention, are in the severely flood-affected areas, and half of them are high- to- moderately challenged, mostly by anthropogenic causes.[52] In addition, two of the six Ramras sites of Sri Lan-

50. http://www.rainforestprotectors.org/rainforest/documents/Campaigns/2015/Protect%20Sinharaja%20World%20Heritage%20Rainforest.pdf

51. FGD in Colombo 17 July

52. (IUCN/IWMI /CEA, 2006) http://www.cea.lk/web/images/pdf/7-1.Book-National-Wetland-Directory-Low%20res(1).pdf

WASTE DUMPING SITE IN GALLE AND POLLUTION OF WETLAND AREAS

FIGURE 21: WASTE DUMPING SITE IN GALLE
SOURCE: GAMIGEDRA GALLE

ka; Bundala and Maduganga wetlands, are in the flood-affected areas. As mentioned in the PDNA 2016, wetlands have been exploited and damaged with negative changes to ecosystems, as well as changed in many ways due to urban development. The continuing to use wetlands as urban waste dumps is possibly the most destructive intervention. Many waste -dumping sites continue to be either wetlands or sites close to rivers. The result is the heavy contamination of water posing health risks to people & animals, and the inability of the wetlands to perform the vital function of reducing impacts of floods.

The rivers of Sri Lanka are affected by several factors: the construction of buildings; commercial activity (authorised and unauthorised) and related pollution along the sides of rivers; irregular commercial plantations; the use of heavy equipment; sand, stone, quarry and soil mining; irregular construction of tube wells; and continually used as waste disposal sites by settlements, plantations and commercial enterprises.

Sand mining has been a highly contentious issue over the last few years; particularly over the last two years. River-sand mining has been regulated by the Mines and Minerals Act since 1992, but illegally-mined sand continues to come into the market. With the intention of providing a monitoring mechanism on sand transportation, the law was amended in 2004, making it mandatory to obtain a permit to transport sand. It has been alleged that there are many loopholes in the law-making way for illegal mining. A ban on sand mining in the rivers of Sri Lanka has been imposed (e.g. in 2015) and lifted (e.g. in 2017) alternatively. Sand mining has been intensive, and with increasing demand, vehicles were driven directly into the river to extract sand. The ban triggered even higher demand for sand; although scarce due to overexploitation. This has led to riskier mining operations. At present, sand is extracted from the middle of the river, going down to about 16 feet. It is reported that while young men with diving skills consider this a lucrative employment option, they often fall victim to gradual loss of hearing, as safety gear is not used for this illegal diving operation. People on the Gin basin in Galle introduced crocodiles to prevent illegal sand mining in Gin Ganga, although this only had a short-term impact. Apparently, the illegal activity enjoys the patronage of some government administrative officers and politicians in the area, and continues unabated. Riverbanks that existed decades ago have ceased to exist, while people have stopped swimming in Gin Ganga due to its dangerous depth.[53]

53. FGD on 4th August at Baddegama DS office

FIGURE 22: GIN GANGA AFFECTED BY SAND DUNES

Sand mining has also increased the amount of slit in river beds, while the increased depth has resulted in low water levels in the river during dry periods. The deepened rivers extract ground water from wells and cultivated lands in the surrounding area, impacting the water security of farming communities. Drying up of wells in the vicinity, and sea-water's intrusion in the coastal areas, have been reported. Even the course of rivers has reportedly changed due to sand mining, with severe embankment collapse (e.g. Gin Ganga), and the instability of embankments poses risks to land and to structures. Sand mining also has changed the natural function of river bed – inability to maintain natural riffles and pools that helps powerful but controlled river flow which impact its course and function.

For example, the outfall of the Gin Ganga located in Galle town, is blocked with sand dunes during dry periods. The inability of Gin Ganga to break through the sand barriers during rains is a major cause for the usual flooding in the lower end of the Gin Ganga basin. The constructed breakthrough barriers including the fall to sea create recurrent flooding even during a small rain.

Management of Local Infrastructure and Services

Lack of integrated planning of the local infrastructure is a barrier to taking a holistic approach and has given rise to serious disaster risks and land-related social concerns.[54] As reported in the PDNA of 2016, poorly-maintained drainage and canal systems are unable to cope with increased volumes of water during the monsoon period and in extreme situations. The waste deposit that ends up in the canal and drains due to improper waste disposal in urban areas makes this situation worse.

According to the Department of Meteorology, Sri Lanka receives over 5000 mm rainfall in the wettest parts (western slopes of the central highlands). Most water that flows through the wet zone goes to sea. The exceptions are Kelani and Walawe rivers, which also provide water to generate electricity. Flood management systems have been established in rivers such as Kalu, Gin and Nilwala due to recurrent flooding in the wet zone coast. These structures and mechanisms introduced decades back reportedly to have functioned effectively as flood barriers; although in some instances at the cost of generating environmental concerns (e.g. acidity development at Nilwala[55] and drying up of natural springs around Baddegama[56]). However, questions are raised about the continued effectiveness of these systems in

54. DS Baddegama 4th August at FGD
55. Senevirathne and Wijesekera 2003
56. FGD on 4th August

FIGURE 23: GIN GANGA- SAND BAGS PLACED TO PREVENT FLASH FLOODS

FIGURE 24: MUNICIPAL WASTE DUMPING SITE GALLE, FROM A DISTANCE

the changed context of increased volumes of water received, changes to land use, particularly settlements and businesses that have come up in flood plains, river reservations, drainage issues downstream, weak maintenance (e.g. pump stations of Gin and Nilwala), and violation of safety protocols of flood regulation, etc. Some structures are even being compromised due to new development (e.g. the Southern Highway blocks flood-drainage paths introduced by the Gin-ganga Flood Regulation project close to Baddegama interchange). Further, people have been expressing fear about the ability of the infrastructure to withstand increased flood pressure, as cracks and leaks have appeared during the floods. (E.g. Leaks in the flood barriers of Gin Ganga that created fear amongst people).[57]

Sand bags were placed at the flood-prevention bunts by people fearing flash floods, with the help of armed forces engaged in relief where water leak from breached bunts occurred.

Southern Expressway is considered the first step towards the 1000 km of highways planned in Sri Lanka. While parts of the highway were affected by landslides and submerged during the floods in 2016, the highway is also considered the reason for flooding in areas which were usually safe from floods. The highway has been constructed on a platform created by filling land, instead of being built on concrete pillars like in many other countries.[58] This requires large volumes of soil and causes the fragmentation of both land and of habitation, resulting in the change of land use, often with negative environmental implications. Most importantly, it blocks the free movement of rain water (and animals) to the other side of the structure. The soil needed for the building of highways is supplied at the cost of razing hillocks and/or excavating large pits in the interior of the country. These too have given rise to many environmental (and social) problems in addition to contributing to the floods.

People also believe that the use of glyphosate, the weedicide widely used in agriculture in Sri Lanka, contributes to increasing soil erosion and risk of landslides.[59] They claim that the effect of glyphosate on soil is evident as it has been commonly used to loosen soil when extracting manioc tubers. While we have not found scientific evidence to substantiate this claim, reports confirm that glyphosate has subtle but disruptive impacts on the ecosystem, especially the soil's ecosystem based on its interaction with soil microorganisms.[60] The effects include soil

57. Seneviratne and Wijesekara 2003 http://library.wur.nl/ebooks/drainage/drainage_cd/3.3%20lakshmane%20sw%20and%20wijesekera%20nts.html

58. The Island June 2017 http://island.lk/index.php?page_cat=article-details&page=article-details&code_title=166201

59. FGD in Colombo in July

60. Pesticide Action Network – 2017 Glyphosate

degradation due to long-term disintegration of carbon in humus.[61] The ban of glyphosate or 'Round Up' as it is commonly called, was announced by the President at a public gathering in May 2015 with immediate effect due to its link to CKDu, which is spreading across the dry zone of Sri Lanka claiming many lives. While the Rajarata University claims that there is enough scientific evidence to link glyphosate to cancer and chronic kidney disease (CKD), in March 2017, the WHO also announced that the glyphosate probability to be carcinogenic to humans"62, on basis of the research undertaken by International Agency for Research on Cancer (IARC).

The municipal waste-management context reported in the PDNA of 2016 has not improved, but aggravated over the last year. The waste slide in Meetotamulla dump killed 34 people in mid-April 2017, politicising the problem. While dumping at Meetotamulla was suspended immediately as a result, the Government was forced to come up with alternatives as garbage piles started appearing on roadsides in Colombo. While the environmental cost of proposed alternatives such as dumping unsorted waste around Muthurajawela and transporting it to Aruwakkalu, Puttalam to an abandoned quarry mine would be huge, the government will implement these as short-term measures. Incineration, electricity production through biogas generation, accelerated composting, and sanitary landfills are being discussed as well. Municipal waste management in the urban areas of Galle Matara, Kalutara, Ratnapura and Hambantotoa are in similar status as above.

An example is a garbage dump that seems to be gradually growing up to becoming a huge mountain-like structure in Meethotamulla can be seen alongside the sky-scraping apartments from the beautiful beachfront of Demodara. As shown in the above picture, it is a large dump maintained by the municipal council of Galle. Due to it, the leachate water in the outfall has been polluted and people cannot swim or fish in it. The other consequence of the landfill is non-degradable materials and the waste controlling officer informed that there will be a project to eliminate these wastes in the land-fill. The main objective of the project is placing an incineration machine.

While waste disposal is a challenge at municipal levels, the degradable part of solid waste continues to be disposed of at the household level, as traditionally done in rural areas. The high volume of non-degradable waste generated due to modern consumption patterns have spread to rural areas, while waste collection is not practiced or is irregular in local authority areas. People, as a result, have resorted to using rivers to dispose non-degradable waste (picture). The waste collected downstream, is a constant challenge, blocking canals and drainage systems, giving rise to spreading diseases. This becomes a bigger challenge during the rainy season, blocking the flow of river and contributing heavily to urban floods in coastal towns.

Status of policy and institutional mechanisms and their implementations

FIGURE 25: A BAG OF PLASTIC WASTE THROWN IS FLOATING DOWNSTREAM, GIN GANGA, GALLE

Monograph https://issuu.com/pan-uk/docs/glyphosate_monograph_complete

61. Ranil Senanayake, Sunday observer 2017 http://sundayobserver.lk/2017/06/25/features/%E2%80%98all-plants-will-be-killed%E2%80%99
62. Wijedasa and Surendraraj 2015 http://www.sundaytimes.lk/150607/news/glyphosate-ban-mired-in-confusion-152113.html

TABLE 79: ECOLOGICAL STATUS AND DISASTER IMPACTS

Cluster		Ecological status of affected areas	Impact
Kalu river basin	Ratnapura and Kalutara	Built environment, plantations and highly fragmented wetlands and forests	Urban floods from overflow of Kalu river associated wetlands
Gin river basin	Galle	Paddy lands with substantial dry zone forests	Floods and landslides due to high rain in the rain forests and release of water from reservoirs
Nilwala river basin	Matara	Coastal area with densely built environment in urban areas with paddy and other crop plantations	Floods and Landslides
	Hambantota	Dry Zone	Floods and landslides

The context described in the PDNA of 2016 has not changed much over the year. The Ministry of Mahaweli Development and Environment (MMDE), continues to be the policy-making body with respect to environmental management, and the Central Environment Authority (CEA) has the wider regulatory powers. Having signed the Paris Agreement in early 2016, the Government of Sri Lanka proposed INDCs under three categories: mitigation, adaptation and loss and damage, with the commitment to reduce GHG emissions up to 16%, by 2030. The targets became NDCs in early September 2016 when the Government ratified it. The sectoral agencies are required to plan for achieving the respective NDC targets, starting 2020. Further, the government also has issued instructions to sectoral agencies to align their plans with the 17 Sustainable Development Goals (SDGs), in an attempt to mainstream SDG implementation through national budgeting and budget monitoring[63].

While these are highly-progressive steps in the right direction, there are a lot of concerns about achieving the expected result with existing gaps in the institutional, technical and administrative capacities of respective institutions, and the ability to regulate and enforce the law by relevant authorities. The status is highly complex with duplicity in the attitude and approach by decision makers when addressing address environmental and developmental issues in the country.

10.3. POST-DISASTER EFFECTS

Floods

Heavy rains received starting on May 25,2017 led to riverine foods of the Kalu, Nilwala, and Gin rivers, affecting areas in the river basins and causing urban floods in coastal areas. Apart from these districts considered in the PDNA, floods were also reported in areas around Kelani River. (Table 79)

Landslides

The high rainfall trigged 35 significant landslides, and many smaller ones, across the affected districts. The high incidences of landslides that occurred in the Ratnapura district has been attributed to the newly-constructed roads (e.g. Kalwana, Nivithigala[64]) which have cutting failures, along with improper and inadequate drainage and culverts. With the recording of

63. Budget Call 2018, Ministry of Finance and Mass Media, 25.7.2017.

64. FDG July in Colombo

slips and mudslides in several locations, people have begun to call these 'engineered landslides'. The landslides also degraded landscapes by causing offsite damages, such as the siltation of agricultural lands (tea, rubber, coconut and paddy), and water bodies. There have been reported incidences of floods and flash floods in areas considered safe from floods, due to the diversion of rivers and flood water, and landslides falling onto river paths.

Disruption of Sectoral Governance

There is no evidence to show that the services of multiple agencies that are tasked with conserving and managing the natural environment have been significantly affected, apart from the instances listed below. Gathering data related to damages and losses to the environment sector was challenging this year too. While most line agencies have collected respective data (e.g. NBRO, FD, and DWC) and information related their own interest, there are gaps preventing a good understanding of the complex overall situation and in arriving the ability monitor changes in the environment sector.

Summary of Damages and Losses

Although the environment sector has sustained considerable damages as stated throughout this document, these are not well and systematically captured and recorded. While acknowledging that capturing the status of environment and damages and losses are extremely challenging, little or no interest shown about the environmental effects, especially by agencies that are mandated to work on environmental issues, is a concern. As reported in the PDNA of 2016, making a reliable estimate and arriving at an accurate picture of damages to natural resources such as forests, wildlife, biodiversity, wetlands, land, etc., have become more challenging.

During the data collection processes of PDNA 2017, attempts were made to gather data and information, which were mostly qualitative. Estimates were derived by comparing and cross-referencing these with data collected by other sectors, and by interviewing local officials and communities. Following the district-level FGDs, a special focused group discussion was convened in Colombo on July 18, 2017, focusing mainly on the effect of natural disasters on the environment sector. Selected NGOs and CBOs, who assisted the Government during the emergency and in carrying out relief measures, participated from all the districts considered in the PDNA. A further visit and an additional FDG were carried out in Galle with multiple stakeholders including local officials, on August 4, prior to finalising this chapter. The general lack of information was acknowledged over and over again, when stakeholders could only describe damages.

As mentioned, environmental losses are difficult to estimate even with the availability of accurate data. Gaps in data, therefore, make it an impossible task. Similar to the last PDNA, damages to natural capital/ecosystems was estimated only through proxies.

Landslide Related Damages and Losses

An approximate calculation of loss due to the main landslides across selected districts was carried out utilizing proxies given in the Table 3. The proxies are derived out of academic and project-related research carried out over a few years by the Department of Environmental Science and Forestry of University of Sri Jayawardhanapura. It can only be used as an indication of minimum levels of economic losses due to environmental damage. The estimation of the Net Present Value of ecosystem services (carbon sequestration values and watershed protection values), and values of non-timber forest products, (pharmaceutical prospecting values of natural forests), were estimated using 10% discount rate and a 30-year time period. (Table 80 to 82)

Flood-Related Damages and Losses

Embankments have collapsed in many places along rivers due to enormous pressure created by the river's flood water and as a result of a va-

TABLE 80: INFRASTRUCTURE DAMAGE OCCURRED WITHIN THE FOLLOWING AREAS UNDER THE JURISDICTION OF THE FOREST DEPARTMENT

Protected Area	Damage	Damage (LKR Million)
Office of regional deputy conservator of Forest, Ratnapura	Fully submerged under water loss and damages to office equipment and furniture.	Included in the DRR Chapter
	Inability to provide the services for a week	

TABLE 81: ECOSYSTEM SERVICE LOSSES DUE TO LANDSLIDES
SOURCE: **UNIVERSITY OF SRI JAYAWRDHANAPURA**

Loss	Extent (ha)	Approximate Value LKR (Net Present Value)
Homestead	1.4.	27,632,125.54
Natural Forest	21.37	335,707,276.90
Other Cultivation	0.5	1,876,782.80
Paddy	1.27	4,188,108.26
Rubber	14.51	51,300,915.14
Tea	36.46	127,239,411.10
Total	**75.51**	**547,944,619.70**

TABLE 82: LOSS OF REVENUE DUE TO LOSS OF SERVICES IN THE AFFECTED AREAS
SOURCE: **DEPARTMENT OF WILDLIFE CONVERSATION, FOREST DEPARTMENT**

Facility	Visitor Number		Income (LKR)		Estimated Loss of Income (LKR)
	May 2017	June 2017	May 2017	June 2017	
Yala	30,093	28,480	27,723,410.00	25,765,740.00	1,957,670.00
Udawalawa	11,848	9,539	9,713,939.00	8,575,695.00	1,138,244.00
Lunugamwehera	270	107	27,560.00	8,000.00	19,560.00
Sub Total	**42,211**	**38,126**	**37,464,909.00**	**34,349,435.00**	**3,115,474.00**
Sinharaja Forest					763,400.00
Total Estimated Income Loss (LKR)					**3,878,874.00**

FIGURE 26: EMBANKMENTS ALONG GIN RIVER

riety of anthropogenic actions including sand mining and illegal construction. Embankment losses are seen almost at every natural river bend, in many instances taking away land along the embankment. According to stakeholders, the Galle/Baddegama embankment of Gin Ganga has over 50 places where embankment has collapsed, within Galle district.

While the damages have threatened the stability of infrastructure and buildings, including Government offices and schools built close to the river, the loss of biodiversity and damage to riverine ecosystem has not been captured. It is quite obvious that damages can also be directly linked to paying little respect to river reservations. Overtime, river banks have vanished, taking away some of the unique ecosystems with them. Urgent recovery work has begun due to the need to restore accessibility, but the impact of built embankments on river flow, and restoration of riverine species, is unknown.

Responding to a question raised by a stakeholder at the FGD in Galle, the representative from the Irrigation Department confirmed that there was no overall analysis done or planned post the recent floods, in order to understand the systemic gaps, and to arrive at strategic improvements that can be incorporated into recovery and long-term plans. This reactive approach to damage caused by the disaster has serious implications on the remaining ecology and species that depend on it.

Below is a photo of one of the many embankments collapsed along Gin River, which has taken about half the road with it, causing serious accessibility issues. Gabion walls are being built by RDA to restore the road. But the impact it could have on the river and related risks have not been analysed. The third photo shows a house, which is just an example of the many structures including schools that have become highly vulnerable due to the erosion of the river.

Bamboo is promoted as a river bank stabilisation plant with multiple economic benefits. However, harvesting bamboo has become a tedious process including obtaining permits from the Government, due to which its application in many of the traditional uses, including its wide use in construction sector have drastically declined. As a result, alternatives of bamboo in the construction industry have become popular. The lack of harvesting of bamboo trees has turned them into huge bushes that weigh on the embankments. The collapse of embankments has also taken away overgrown bamboo bushes and even large trees causing further damages downstream, especially in places where the river gets narrower and where there are bridges, breaking has been considered during the flood in Galle. Uprooted bamboo bushes have clogged the rivers causing flash floods.

FGDs also pointed out issues of an aggravated flood situation and stagnation of flood water, due to blocked canals and drainage. Examples

FIGURE 27: UPROOTED BAMBOO BUSHES CLOGGING UP GIN GANGA

of illegal construction blocking canals and drains were discussed as well.

The destruction of houses and other structures created debris, parts of which would have ended up in sensitive coastal ecosystems. There is no evidence of the effects of floods on the wetlands (under SLLRDC) and no assessment has been on its effect on coastal eco systems, or even relevant information collected. The department of Coast Conservation had to spend LKR 3 million to adopt protection measures in response to the damages that happened to the Kaluthara sand dune. Destruction to ecosystems due to removal of debris using machinery to clean wetlands, water ways, coastal ecosystems, etc., have also not been captured or valued. (Table 83)

10.4. CROSS-CUTTING ISSUES

Environmental concerns are cross-cutting in nature. This report argues that increasing disasters present Sri Lanka with no option but to move towards environmentally-sensitive and disaster-risk based integrated planning in the medium and long term. In the short term, it is important to ensure 'Build Back Better' options into the recovery frameworks of all sectors. Example include adhering to land-use regulations appropriate to the area, carrying out strategic environmental assessments, enforcing environmental impact assessment/initial environmental assessment, during reconstruction to minimise future disasters.

Provincial and local authorities must have the adequate capacity and clear mandate to ensure the implementation of environmentally-sensitive and disaster-risk based plans, including the short-term post-disaster recovery initiatives. Therefore, incorporating capacity building within recovery plans should be considered.

Loss of eco-system services will have negative implications on the livelihoods and food security of people in the affected and surrounding areas, as well as far-reaching implications in other geographical areas. Women, who shoulder the main household responsibilities including water and food supply, are likely to experience the negative implications of environmental damages in a stronger way. There is ample evidence that women are more vulnerable to risks and

TABLE 83: SUMMARY TABLE OF LOSSES IN THE ENVIRONMENT SECTOR

SN	Losses	LKR	USD
1	Ecological service losses	547,944,619.70	3,652,964.13
2	Loss of revenue	3,878,874.00	25,859.16
3	Protection measures (Kaluthara sand dune)	300,000.00	2,000
	Total	**552,123,493.70**	**3,680,823.29**

are impacted by disasters. At the same time, women are a strong and reliable force when it comes to building resilience. It is important to ensure that women are included and given the 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.

Affected communities should also be an active force in recovery, as their improved understanding of links between environmental management and DRR can contribute significantly towards sustainable recovery. It is important to emphasise on including the most vulnerable people, as their awareness and commitment are extremely important, especially to achieve medium- and long-term recovery targets.

10.5. RECOVERY NEEDS AND STRATEGIES

Environmental restoration is a long-term process. While, proper restoration can only be achieved in the long term through consistent commitment, as detailed out below, measures must be taken in the short- and medium-term to prevent further deterioration of the vulnerable environment due to disasters and other anthropogenic impacts. The limited information available on the damages and losses incurred by the disaster, and the long-term nature of environmental recovery, make the recovery estimations highly challenging as environment is a cross-cutting area and some aspects of environmental recovery are considered within the sectoral estimates as part of 'Build Back Better' measures. Therefore, while the recovery and reconstruction strategy is linked to all these aspects, estimations given in Table 84 attempt to focus only on areas not considered by sectoral estimates.

Recovery and Reconstruction Costs

Recommendations

As damages and losses increase with each disaster, taking away or reducing the value of national and local investments, achieving Sri Lanka's ambitious growth targets becomes even more challenging. The logic of higher initial investment to minimise risks and build resilience ('investing 1 dollar on disaster risk reduction now to save 7 dollars later': UNISDR 2007), not only makes sense, but also the only choice Sri Lanka has. A move towards long-term planning based on environmental concerns and disaster-related risks therefore, becomes the only option with integrated national and local planning so that the whole country's development falls in line with this logic.

The country must have one national development plan which embeds disaster-related management plans, climate change adaptation and mitigation plans, national bio-diversity improvement plans, forest revival plans, etc., rather than having separate independent plans developed by different authorities as practiced at present, which get inadequate attention and are not implemented as intended. Instead, a national development plan should be a plan that guides the nation towards sustainable development by considering social and environmental concerns together, to achieve economic goals. This approach supports the principles of the Paris Agreement, which Sri Lanka is a signatory to, and is in line with the range of environment– and disaster-related international agreements, which the country has endorsed. It is also important to ensure that these comprehensive strategic plans are not changed based on national or local political scenarios, and/or bureaucratic pressure.

The recovery strategy proposed in the above-mentioned table suggests some initial steps towards a bigger strategic direction, where environmental conservation and management are central to deliver growth and to reach the developmental ambitions of the country. The short- and medium-term plans needed in response to the disaster should have links to overall long-term development plans.

TABLE 84: ESTIMATED COST OF RECOVERY

Issue	(LKR Million)			
	Short-term	Medium-term	Long-term	Total (S+ M)
Review the national physical plan and other key investment plans that aim at accelerated national growth (e.g. highways, Megapolis regions) and assess short medium and long term risks and realistic costs of managing economic, social and environment risks through more open dialogue. This should provide the economic basis for shifting towards integrated planning which incorporate ecological landscape rationale (e.g. river basins, seascapes) with long term perspective. Sustainable reviving of affected area can be carried out as part of this plan. Governments, sectoral and local plans based on climate resilient and adaptive approaches should be within the integrated plans	25 To develop a vision and a strategy; to revise National physical Plan	75 To develop an national/local development plans and guidance and capacity development for planning and implementing integrated development including at the local levels Start roll out / implementing integrated plans	X Systems are in place for implementing and regulating; with capacity and resources to monitor risks, management of risks and revise integrated plans periodically/as needed	100
Review development plans implemented and planned for the affected area, that have impacts on sensitive ecosystems, especially those that involve encroachment of the forest and buffer-zone causing fragmentation of habitat and its transformation. Using tools for eco system valuation estimate total or true costs and benefits of development and move towards achieving more sustainable economic and social development targets. This would be an assessment which inputs into integrated planning mentioned above	20 Cost of review, revision of development of alternative plans through wide consultation including with people who are currently affected and cost of changed implementation (e.g. compensation, incentive's, etc.)	100 Incentives / compensation scheme to implement		120
Review impacts of disaster on affected rainforests and review NRIFAP to include recent damages and disaster risk management. Management plans of rainforests and protected areas has to eventually be aligned with above mentioned integrated planning	5	5		10
Review plans for mini-hydro power generation in the country and in the affected area, taking changes to cost structures of the other alternative energy options and calculating total costs, of mini hydro projects as whole including ecological costs rather than considering each project separately. If necessary revise Sri Lanka's electricity generation plan 2018-2037.	25 Opening electricity generation plan for wider discussion and involving academia and specialists including international in alternative energy and electricity generation to find the best way for country achieve economic targets while not compromising on social and environmental goals	10	X	35

TABLE 84: ESTIMATED COST OF RECOVERY

Issue	(LKR Million)			
	Short-term	Medium-term	Long-term	Total (S+ M)
Record and review ecological damages to riverbanks including those due to related restoration efforts, Identify vulnerabilities and possible new risks created. Include finding river basin level strategies, which should be developed as key components of national sustainable development vision and strategies. Use the findings to guide short and medium-term restoration and embankment stabilisation efforts are sustainable. These strategies must also take in to account the existing construction and infrastructure development on river reservations, land use changes to the basins, extraction of sand, diversion of waste to rivers, maintenance of canals and tributaries linked to the river etc. Particularly damages to Gin Ganga and Nilwala (as JAICA focuses on Kalu ganga at present) including flood redirection projects. These must be assessed soon and necessary short term and medium-term measures taken to alleviate possible risks	50	50		100
Review and capture the true costs of sand mining to urgently and proactively look for immediate viable alternatives (e.g. construction techniques that require less sand) and invest on research to look for alternative to sand in construction.	25	50	x	75
Review costs of ecological impacts created by canals and drainage systems, which block natural water flow. Propose and implement ecological retrofitting in the short term together with public awareness and strict enforcement of penalties for irresponsible individual actions. In the medium and long-term these should integrate with river basin development plans and integrated into local and urban development plans	25	15	X	40
Review and estimate damages to wetlands and other sensitive ecosystems due to disaster and early recovery. Develop participatory restoration plans with all key stakeholders and implement within the scope of integrated planning	15	25	X	40
Use above estimations to advocate for more investment to improve urban waste management systems within integrated planning, to minimise pollution to environmentally sensitive areas	5	5		10
Ensure consolidation of data and information gathering to give more evidence based updates to decision makers on the status of environment and improve system of capturing and monitoring status of environmental during and after disasters.	75	100		175
Implement protection measures near the Kaluthara sand dune damage area	3			
Total	**303**	**530**		**830**

Only a conservative estimate of the cost of the proposed recovery has been offered, as more realistic estimates can only be derived through much greater consultations, given the complexities mentioned above. Wide consultations are a prerequisite to shift towards development, which is based on true commitment to environmental management.

Resilience building through development and preparedness: While, at present, the connection between environment, development and disasters is rarely disputed, there are inadequate attempts to understand their inter-connected and multiple roles. More specifically, the development which is disaster risk based and environment sensitive is beneficial, while ill planned development can be destructive.

While Sri Lanka has embraced the 2015 Paris Summit which will lead to Sustainable Development at the highest levels, the nation also seems to have given into pressures for short-term political gains by allowing destructive practices (e.g. reissuing of licenses for river sand mining). The recognition of the role that environment plays in disasters and its consequential costs, are often forgotten after disasters, especially when attempting to make competitive cases for short-term financial or political gains (e.g. the port city, dumping waste in Muthurajawela). As more frequent and intense disasters become the new norm, it would be prudent for the Government to consider shifting current developmental approaches, so that development becomes sustainable and, Sri Lanka is better resilient and prepared for such situations. Political support for the required shift should be created through public awareness and supporting research to generate further local evidence and viable alternative options.

Integrated plans based on improved land use strategies and ecological landscapes principles (e.g. river basin):

As lack of respect for land use and integrated plans creates heavy risks, it is important to ensure strict enforcement of the same. All agencies and ministries must adhere to these plans collectively, irrespective of change in governments, ministries, and political and bureaucratic power at national and local levels. It is necessary to create awareness amongst national and local politicians, and officials, and amongst the public, to get necessary political support to continue with agreed plans.

Integrated planning must be developed or plans should be revised to align with ecological landscape management principles, which include strictly regulate construction and infrastructural development in safe locations assigned for built environment development while leaving, environmentally sensitive and risk-prone areas, as much as possible, for forests and regulated cultivation. Further, regulating and managing rivers, river reserves, river tributaries and channels, wetlands as well as drainage and waste management in urban areas should be made interlinked parts of all plans. The proposed NRIFAP may be revised in line with integrated planning to ensure forests too are well-recognized within plans.

Addressing Development Induced Risks:

Careful observations show that instances of landslide, which were rare and one off in the past with minimum casualties and loss, have drastically increased in all fronts. Landslides in May 2017 were not just too many in number, but occurred in areas where landslide risk was not considered at all (e.g. Padukka in Colombo district). Risks to slope stability created by infrastructural development such as roads, railway and buildings, are identified as key reasons for this. It is, therefore, important to make necessary changes to the way development takes place and risks generated through development are assessed, and the way in which risk-reduction and risk-management measures are incorporated within projects (e.g. infrastructure development planning to externalize substan-

tial risks to achieve cost minimization and how this must be revised). Alternative approaches such as soil nailing (the insertion of steel rods into an unstable slope to pin it in position) and soil bio-engineering, (spraying a mixture of grass-seeds, other seeds and fertilizer onto a suitable matrix so that when the seeds germinate, roots hold the underlying soil in place), studied by RDA with academic inputs[65], should be taken forward putting necessary policy and practice change in to place.

Review Mini-Hydro Investment plans: A review of the latest electricity-generation plan, which recommends mini-hydro development until 2037, must be reviewed in light of their potential negative contribution to severe generation of risk. In addition to this, a plan to reduce and manage risks created by existing mini hydro projects must be developed and implemented, while considering the possibility of the need to phase out and dismantle mini -hydro projects in the long term.

Review River Sand Mining: Given the risks and destruction caused by sand extraction, urgent attention should be paid to the identification of alternatives. It is also important to identify and promote alternative construction methods that do not require substantial amounts of sand.

A Proposal for using excessive sand accumulation in lagoons in Puttalam district as an alternate is being considered at present. It is important to ensure comprehensive environment amendment is done before implementing such an alternative where sensitive ecosystem is implicated.

Strengthening of embankment: The impact of introducing many built embankments to rivers should be reviewed as this can create ecological problems elsewhere along the river. A plan for the strengthening of embankments should be developed based on this understanding and as mentioned above respecting its reserves, flood plains and boundaries when recommending land use. Scientific research can be conducted to ascertain the best plants (or combination of plants) that should be grown along river banks under the current context to strengthen embankments, and reducing soil erosion and flooding. In this particular scenario, people propose growing bamboo together with Kumbuk as opposed and Valdel and other species as alternatives.

Protection of Wetlands: Ensuring as much water retention as possible in all areas of river basins and wetlands, such as marshy areas, paddy fields, and lakes is very important in this context. Further, wetlands in coastal areas are important to be conserved and protected to allow these to perform their function of protecting everyone from floods; one of many important functions they perform. National policy on wetlands and strategy (2006) should be used as guidance to implement relevant plans. A comprehensive and long-term plan should encompass the revival of wetlands where possible, including the removal of blockades for water flow including small dams and anicuts as appropriate.

Pollution Control of Rivers: There needs to be a thorough review of the current status of the rivers which are subjected to disposal of industrial, commercial and domestic waste, and making recommendations to remove all polluting sources from the reservations, and find ing alternative waste disposal methods for sources. This should be an input to the developmental plans, as well as in the implementation of the above-mentioned river management plans. The CEA must build up its capacity and resources to ensure this.

Research on Glyphosate: Although the impact of glyphosate on health is evidenced by

65. Jayasena 2008, http://www.academia.edu/28312517/Stabilizing_Slopes_Sri_Lanka_Examples_of_Natural_Disaster_mitigation_in_Small_Island_Developing_States

many recent reports including those by WHO and Global Pesticide Network, the Government has given into the demands of the tea industry lobby to allow its use in tea plantations. Since the slope and soil destabilisation impacts of Glyphosate are not scientifically established, it will be worthwhile to carry out scientific research to understand whether and what correlation exists between the use of glyphosate and the increased risks of landslides.

Review and take action to mitigate risks around Gin and Nilwala rivers' flood-management projects: Review the ability of these projects to deliver intended objectives and the risks involved due to weak maintenance, the ageing of structures, etc. Also, make recommendations for reducing pressure downstream including considering diversions of excess water to dry areas such as Hambantota.

Risk Management in Ratnapura: Review risks of landslides and collapse of earth, especially in Pelmadulla Ratnapura district, and put safety and migratory measures in place.

Data and Information gathering on environment and monitoring: The PDNA of 2016 pointed out that environmental damages and losses had not been captured by relevant authorities and therefore, were not considered in the recovery and development plans. Unfortunately, no improvements have been made over the last year too on this front. Despite the recommendations of PDNA 2016, once again, environment has not been considered in any of the rapid assessments carried out by the Government in May-June 2017. Therefore, the Ministry of (Mahaweli Development and) Environment must step up to work with the Ministry of National Policies and Economic Affairs, and the Ministry of Disaster Management to ensure the required monitoring of the status of the environment, with the help of other agencies such as FD, DWC, MEPA, etc. and to convince the NPD to issue directives to sectoral agencies to plan recovery-related and developmental projects accordingly.

Use of Local Knowledge for Risk Minimisation: Historic and local environmental factors should be considered in developing sound infrastructure projects. While local communities bear the brunt of the impact of disasters, the community's views are not seriously taken up in development. Research reveals that in many instances, calamities have been averted or its impacts reduced, when local knowledge has been considered in planning and implementing initiatives. Similarly, damages and losses are shown to be high where infrastructural construction has ignored or inadequately considered the local environmental conditions. E.g., Gin Ganga floods control, Nilwala Ganga Flood Control, and Colombo Matara Expressway.

Ensure active public and stakeholder involvement in developmental planning and environmental management at district-level and division secretariat levels, particularly in the design and implementation stages of new projects. Their voice needs to be heard in the District Development Committees (DDC) from the very beginning to ensure that they become supportive and individually accountable as well.

Further, where environmental degradation, such as damage to wetlands or deforestation exists, the civil society can be a force that the Government can use to work with the relevant authorities to implement risk-minimising efforts, as well as restore the destructed ecosystem through the community's involvement. The civil society can also play a vital role in representing the community's voice at district and divisional levels.

As an immediate step, empower, organise and equip local communities to better understand and better face disaster-related situations. They must understand their own role in contributing to aggravating risks and vulnerabilities and that

should help them to contribute better towards sustainable post-disaster recovery.

Enforce the existing Law: The conversion of highlands to tea and rubber plantations, as well as other commercial plantations (such as palm oil), has been observed as a contributing factor that triggered the increased occurrence of landslides. Strong recommendations were made by the community's representatives to regulate and implement the already-existing national policy that designates hilly areas with a slope of 60 degrees or above as forest reserves which cannot be deforested. Reforestation in the slopes and riverine ecosystems is recommended.

Authorities also need to ensure that sufficient provisions are put in place to enforce laws to prevent large-scale environmental destruction and degradation, including rainforests, other forests, rivers, lagoons and wetlands as well as seascapes[66] which are being polluted by the dumping of garbage. This includes considering short-, medium-, and long-term approaches including taking action to remove constructions that have been made in conservation areas, contrary to environmental protection laws.

10.6. IMPLEMENTATION OF STRATEGY FOR RECOVERY

As stated in the PDNA of 2016, 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 C emissions) of Sri Lanka, the implementation of NBSAP, land use policy, National Action Programme for combatting land degradation (UNCCD), commitments to SDGs and Paris agreement 2015, etc., demonstrate the country's commitments to sustainable development. As recommended above, while Sri Lanka needs to move towards a comprehensive sustainable development strategy/plan to achieve national growth/developmental goals and targets, rather than implementing sustainable development plans separately through the above-mentioned initiatives.

Therefore, MMDE must work with MDM to ensure sustainable development and to make sure that disaster risk-reduction elements are built into recovery strategies, and also that they get implemented through relevant developmental initiatives. MNPEA should support MMDE and MDM in this endeavour by directing the review of sectoral development plans to include and prioritise the recommendations by the PDNA, especially during future budget discussions and allocations.

10.7. ASSESSMENT METHODOLOGY

Data and information used for this assessment was collected through: (a) reviewing existing documents and published material, particularly to capture the pre-disaster situation, and (b) collecting quantitative and qualitative data from government officials at the district level guided by a checklist. Focus group discussions carried out in all districts were used as a platform to gather the latter-mentioned data and information.

As the initial analysis carried out based on the above-mentioned data had many gaps-especially due to lack of basic quantitative data related to environmental damages and losses, a special discussion focusing on the environmental impacts of the disaster was conducted at the national level with the participation of CSOs, which has actively engaged in post-disaster operations in the affected districts. This discussion brought out a lot of new information, mostly qualitative, which was incorporated in to the analysis. A special visit to selected affected locations was also made, which was followed up by

66. Sri Lanka ranks the 6th Ocean polluter amongst all countries (ref)

a discussion organized amongst multiple stakeholders in one of the affected districts Galle. Once the analysis was firmed up with additional information collected, some key claims made by stakeholders were cross checked and verified with relevant officials at national institutions.

Constraints

Lack of data to determine environmental damages and losses and no responsible agency/ agencies being available this initiative, etc. were constraints mentioned in the report. One of the serious challenges in compiling this report was the difficulty in accessing available data, and lack of important baseline information. It is important to note that this issue has been recognized by the IPFA report on the 2010 flood event and the PDNA of 2016. 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.

It is important to emphasize that more comprehensive assessments are required to get a better understanding, and to providing a more complete picture on the situation, along with accurate estimation.

11. Disaster Risk Reduction

11.1. EXECUTIVE SUMMARY

The May 2017 floods and landslides caused extensive damage to communities and their assets. It caused massive damage to the rural infrastructure such as roads and the damage to small-scale tea plantations and paddy cultivation had a direct impact on the livelihood of the people. The loss of labour opportunities due to floods has affected rural communities, thereby making them more vulnerable. The secondary damage caused due to 2017 floods, though not classified directly under damage and losses, has weakened the surrounding infrastructure.

As per the Damage and Loss data, there were no reported damages to the Disaster Risk Management infrastructure. However, losses were estimated based on the Government's expenses related to response-based activities, including the cost of relief distribution, management of temporary shelter and logistics incurred by DMC, NDRSC and the Ministry of Defence. However, the cost of engaging government staff in all 24 districts had not been estimated at the time of preparing the report. The total amount of losses incurred by the Government is estimated at LKR 996 million, while the expenses incurred by the UN and other INGOs in providing relief to disaster-affected people are estimated at LKR 1.26 billion.

The shortcomings highlighted with respect to the status of disaster management of the country in the year 2016 were evident during the May-2017 floods as well. There was a complete lack of coordination amongst the key stakeholders, which impacted the smooth functioning of the critical pre- and post-disaster management activities vis-a-vis the relaying of early warning, command and control of the Emergency Operation Centre (EOC), and disaster preparedness and response at the local level.

The recovery-related needs and strategies identified for intervention in the DRR sector are categorized into: (a) Immediate and short-term needs (b) medium-term needs and (c) long-term needs. Under recovery-related needs, following are some of the key interventions that have been identified.

a) Strengthening Early Warning Systems from the National to local level ensuring last-mile connectivity.

b) Strengthening the emergency response preparedness capacity at the community level to receive, understand, and react to early warnings.

c) Assessing the roles and responsibilities of relevant institutions including MoDM, DMC, and NDRSC to agree on clear mandates while minimizing overlaps.

d) Reviewing training-related awareness and capacity-building mechanisms of the main DRM institutions.

e) Reaffirming the central role of the DMC as the disaster management information hub, and strengthening and building the capacity of the information management system.

f) Encouraging the DMC to develop a system to generate and update sex, age, disability disaggregated data, and allowing the analysis and dissemination to address data gaps.

g) Reviving the existing monitoring system to assess the impact of DRR investments in order to strengthen budgetary allocations for DRR measures.

h) Conducting Hazard Risk and Vulnerabil-

ity (HRV) assessments, including river-basin level assessments and mapping for high-risk areas.

i) Creating a Recovery Framework as a key DRM measure to identify policies and strategies during post-disaster recovery.

11.2. PRE-DISASTER CONTEXT AND BASELINE

Hazard profile of Sri Lanka

Sri Lanka frequently experiences hydro-meteorological hazards such as floods, landslides and drought. Over the years, the intensity and frequency of climate-induced disasters have increased, in the country. Documented studies have indicated that this trend can also be attributed to climate change and phenomena such as El Nino[67]. Rapid urbanization and unplanned development are contributory to the growing levels of impact from disaster-related events.

Institutional and legal structure for Disaster Risk Management (DRM)

The legal and institutional structure for disaster management in Sri Lanka is derived from the Sri Lanka Disaster Management Act No. 13 of May 2005. Following the Act, the National Council for Disaster Management (NCDM), a high-level oversight body, was established to provide directives related to DRM efforts in the country. NCDM is chaired by H.E. the President, with Hon'ble Prime Minister as the Vice-chair. The leader of the Opposition, 22 subject Ministers, Chief Ministers of the 9 Provincial Councils and five nominees of the Opposition nominated by the Speaker, are members. The Disaster Management Centre (DMC) was established in July 2005, to implement the directives of the NCDM. The Ministry for Disaster Management (MoDM) was initially established by a Gazette extraordinary in November 2005 under the Prime Minister, and subsequently placed under the subject minister.

The Ministry of Disaster Management is mandated to lead on all aspects related to Disaster Risk Management. Its main functions as detailed in the Gazette extraordinary, include formulation of policies, programmes and projects for disaster mitigation, response and recovery; the formulation of National Disaster Management Plan and National Emergency Operation plan based on National policy, providing direction and assistance in implementation of aforesaid policies, programmes and projects within the time-frame agreed with the National Planning authorities and within budgetary resources, liaising with Ministries and Government organizations to ensure the timely execution of the aforesaid activities, the implementation of the early warning system, rescue operations, providing relief in disaster situations, overall coordination, and research and development[68].

The Ministry of Disaster Management currently comprises of the Disaster Management Centre (DMC), Department of Meteorology, National Building Research Organization (NBRO), and the National Disaster Relief Services Centre (NDRSC) to implement its core functions outlined in the Gazette notification. An implementation mechanism, consisting of the National Disaster Management Coordinating Committee (NDMCC), chaired by the Secretary to the Ministry was set up to achieve the coordination of DRM with key Ministries, departments, and other stakeholders[69]. Sim-

67. Ministry of Mahaweli Development and Environment 2015, National Adaptation Plan for Climate Change Impact in Sri Lanka: 2016 to 2025; UNESCAP, RIMES, Science and Policy Knowledge Series, Integration of DRR and Climate Change Adaptation into Sustainable Development, El Nino 2015/16 Impact outlooks and Policy Implications, December 2015.

68. Special Gazette issued on 22nd November 2010 presented in Annual Performance Report, 2015, Ministry of Disaster Management, 2015

69. National Disaster Management Coordinating Committee (NDMCC) represents the globally promoted National Platform for Disaster Risk

ilarly, Coordinating Committees have been established at the District, Divisional and Grama Niladhari level. The NDMCC has the mandate to generate DRM policy recommendations to the NCDM through coordination of all government, UN, NGOs and private-sector agencies. The NDMCC used to meet on a monthly basis[70] providing the opportunity for coordination at the national level with all other mandated agencies through sharing of information, advocacy, joint DRM planning, and implementation.

The National Disaster Management Plan, National Emergency Operation Plan, the Framework for Disaster Risk Reduction and the National Emergency Response Plan of the country have been completed with extensive consultation process. Volume II of the Road Map, 'Towards a Safer Sri Lanka 2005-2015' and 'Sri Lanka Comprehensive Disaster Management Program (2014-2018)' are the Cabinet-approved programmes for the implementation of DRM activities in the country.

DRM Financing

An analysis of the budget estimates from 2009 to 2016 reveals that the total allocation for direct interventions related to Disaster Management activities by agencies under the purview of the Ministry of Disaster Management varies from 0.04 percent to 0.1 percent against the total annual budget.

Annual Allocation of MoDM 2013-2016

(Table 85)

The allocations to the MoDM from the National Treasury are supplemented by bilateral and multi-lateral donors, Development Banks, UN agencies and the private sector, to implement projects labelled as priority. For the period between 2006 and 2016, 39 such investments and projects have been implemented, towards

Reduction. http://www.unisdr.org/files/601_engguidelinesnpdrr.pdf

70. The practice of regular meetings of NDMCC has continued till about early 2015

TABLE 85: BUDGET ALLOCATION TO THE MINISTRY OF DISASTER MANAGEMENT

Description		Annual expenditure in LKR Millions											
		2013			2014			2015			2016		
		Budgetary Allocation	Expenditure	%	Budgetary Allocation	Expenditure	%	Budgetary Allocation	Expenditure	%	Budgetary Allocation	Expenditure	%
Agencies under the MoDM	DMC	353	310	88	923	448	48	485	290	60	385	350	90
	NDRSC	723	205	28	2380	426	18	1452	376	26	2186	811	37
	NBRO	272	92	34	N/A	126	-	N/A	173	-	N/A	213	-
	DoM	250	151	60	84	73	87	603	360	60	342	307	90
Total annual budget of the government		2,566,996			2,599,000			3,338,000			3,699,000		
Allocation for DM as a % against total annual budget of the GoSL		0.10			0.23			0.13			0.16		

improving the medium- and long-term DRM capacities of the country, amounting to approximately US$ 1.5 billion. Further, sectoral ministries continue to invest on DRM-related activities within their respective mandates and capacities.

The physical capital of the MoDM includes disaster-related response and rescue equipment and vehicles, distributed up to the Divisional level. There are also 52 search and rescue teams from the Sri Lankan Army and Navy as well as volunteer teams at the local level. The Ministry also maintains a District and Divisional level data-base titled, 'Sri Lanka National disaster resources network' with information on specific equipment such as water bowsers, boats and engines.

Limitations observed in the application of Disaster Risk Management

Within the existing institutional structure, there are several main concerns observed in its effective functioning:

- Lack of clarity of the mandate, legal authority, specific roles and responsibilities of the respective agencies within MoDM;
- Gaps in coordination among the agencies within the overall institutional structure
- Poor awareness of the general public regarding the rules, regulations and the provisions provided by the DM Act and implementing institutions: there has been no consistent mechanism to inform the general public and/or a two-way communication for information sharing between the agencies in the MoDM and the public;
- Data and information-related gaps leading to inaccurate observations and analysis of pre- and post-disaster situations; and
- Ad-hoc nature, poor focus and alignment to the institutional roles and responsibilities in DRM capacity development at the national and local levels

The outcomes of the above-mentioned limitations are apparent in several key areas of DRM:

i) *Gaps in understanding disaster risk and vulnerability:*
The DMC has developed hazard profiles for each province and district for major hazards including floods, drought, landslides, coastal erosion, cyclones, sea surges, sea-level rise, tsunamis, and lightening covering the entire island. However, since the profiles are in different scales, their application in the decision-making process is limited. There appears a gap in not following standard methodologies for Hazard, Risk, and Vulnerability (HRV) assessments. Further, vulnerability assessments for the national or district levels have not been completed. The available risk and vulnerability-related information therefore, is grossly inadequate for informed planning and decision making at national and local levels. Also noted is the expanding numbers and new groups of vulnerable groups such as urban and rural middle-income groups, which need to be factored into the vulnerability assessment.

ii) *Limitations in Early warning*
Early warning and forecast-related messages communicated through national media do not contain sufficient clarity on the possible impact, and/or guidance to the public on the actions to be taken. In the current early warning system, authorities at the national level, including the Emergency Operations Centre (EOC), do not verify the last-mile dissemination. The public is unable to access flood-, cyclone-, and landslide-related warning messages issued through the national media via radio and TV, due to heavy rains, power failures, or when the information is disseminated at late hours when people do not listen to the radio or watch

television. Poor public awareness regarding early warning and lack of trust on the warning messages themselves, add to the overall limitations.

iii) Gaps in preparedness for response

As evident from a number of disasters in the recent past, the planning for the preparedness for response is grossly inadequate. While there are Grama Niladhari, Divisional and District-level plans, prepared by the DMC through consultation with the stakeholders, their implementation and follow up remain weak. There are no pre-identified evacuation venues and/or mechanisms to ensure the safety of the people and property during evacuations. There is no adequate system to assess relief-related requirements; similarly relief coordination and distribution is not streamlined between the public and private sectors. With the increasing frequency and intensity, specifically of floods, landslides and drought, the DRM institutions seem challenged when it comes to displaying the required levels of preparedness for adequate response.

The humanitarian and development partner agencies operational in Sri Lanka have been promoting a Comprehensive School Safety system through the leadership of the Ministry of Education since 2005. In this regard, guidelines on Comprehensive School Safety Plans were developed and capacity building measures on the same were given to relevant authorities and stakeholders over the past decade. The DMC regularly conducts simulation drills and awareness-creation activities in schools to prepare for emergencies. Most of the schools in high-landslide risk areas were given rain gauges to monitor the level of rainfall in order to self-evacuate during heavy rainfall. However, most of the damaged schools during this crisis reportedly did not have a School Safety Committee or Comprehensive School Safety Plan and the rain gauges were not properly used to monitor rainfall.

One main reason attributed to often ineffective and/or weak national and sub-national planning processes, is the lack of effective citizens' engagement. Also, the perspective of women and children on urban and rural environments and development is missing and they have no representation in the planning process.

iv) Protection of the vulnerable

Different kinds of shocks weaken the ability of the most vulnerable to manage risk and to bear the impact of disasters. There is a need for safety-net mechanisms to ensure protection to women, children, and people with disabilities during disaster-related displacement and in recovery phases to prevent gender-based violence, child abuse, trafficking and molestation, etc. When established in conjunction with other risk mitigation/transferring mechanisms, the social protection schemes and safety-nets may help to tackle the impact of disasters.

v) Underlying risk drivers

There are considerable gaps in understanding the underlying drivers of disaster risks, such as the consequences of poverty and inequality, climate change and variability, and unplanned and risk-insensitive development including rapid urbanization. Policies, strategies and programs are not geared to reduce economic and social vulnerabilities, and to protect the vulnerable sections of society. This situation leads to increasing the existing vulnerabilities and creating new risks when interventions are risk insensitive.

vi) Deteriorating community capacity

The individual and collective capacities of the communities have fast deteriorated in the face of escalating risks and disasters. There is also heightened dependency on relief from the Government and other sources. Continuing trends of ad-hoc relief-distribution patterns and support systems during disaster-related emergencies

by public and private agencies have contributed to furthering the dependency of the community.

Sri Lanka Post – Disaster Needs Assessment-May 2016 Floods and Landslides

Following the May 2016 floods and landslides, which affected almost half a million people in 24 districts resulting in loss of life, destruction of houses and livelihoods, a Post Disaster Needs Assessment (PDNA) was conducted by the Ministries of National Policies and Economic Affairs and Disaster Management (in collaboration with the European Union, the World Bank and the United Nations). The PDNA consists of a comprehensive analysis related to the May 2016 events including social, productive, and infrastructure sectors and cross-cutting issues of Environment, DRR, employment and livelihoods, and gender and social inclusion. Based on the analysis, strategies for recovery and a set of policy recommendations were provided.

The PDNA document was approved by the Cabinet[71] with a direction to develop the National Disaster Management Plan – 2018-2022 as proposed, and the Secretary to the Ministry of Disaster Management was directed to submit the same to the Development of National Planning for appraisal, prior to seeking financial assistance for its implementation. The Cabinet paper also accorded due consideration to a number of specific observations of the Ministry of Finance, Ministry of Mega polis and Western Development, and the Ministry of Mahaweli Development and Environment.

The observations submitted by the Ministry of Finance and the Ministry of Mega polis and Western Development show the recognition of the development: disaster risk linkages, root causes of disaster risk, and related critical issues to be addressed through medium- and long-term action in a consistent manner in the areas of:

Need for a National Disaster Management plan inclusive of a comprehensive action program for a 5-year period from 2018 considering that the balance of investments need to implement projects in the Sri Lanka Comprehensive Disaster Management Program (SLCDMP);

Addressing medium- and long-term recovery needs identified in the PDNA: recommendations to reduce the risk of drought in the future; requirements to achieve global targets outlined in the Sendai Framework and Sustainable Development Goals; to share the findings of the PDNA with the Cabinet Ministers; and

To request assistance from national and international donor agencies and donor countries, to implement the specific projects identified in the Program.

The Ministry of Megapolis and Western Development recognized the May 2016 floods as a catastrophic flood, a predominantly urban disaster and expressed the willingness of the Ministry to be closely engaged in the recovery process, along with the Ministry of Disaster Management, to ensure DRR measures for large-scale urban development. In this regard, specific reference has been made to the proposed Water Management Centre of the Ministry of Megapolis and Western Development to address urban development and disaster vulnerability linkages, as well as for providing useful outputs for this purpose.

While the approval of the Cabinet paper of March 2017 will provide strategic directions to take the recommendations of PDNA forward, while looking into how they have been addressed by the respective Ministries/agencies, it has been noted that no further action has been taken towards detailed planning or financial allocations.

71. Cabinet paper No: 17/0321/715/004, dated 15 March 2017

The main recommendations of the PDNA-2016, including preparing a recovery framework, calling for a donor conference, and prioritizing the actions, have not been taken forward due to multiple reasons. These include the prevailing drought situation, as well as issues related to the collapse of Meethotamulla solid waste dumpsite, etc. which shifted the focus from 2016 floods.

11.3. POST-DISASTER EFFECTS

Damage and Losses

The damages normally considered in this section are those related to the infrastructure and facilities relevant for DRR. However, no damages to the DRM infrastructure have been reported during the May-2017 floods and landslides. Damages to the infrastructure related to flood control have been considered in the irrigation chapter.

Losses were calculated based on the Government's expenses related to response-related activities including costs for relief distribution, camp management and logistics' expenditures, incurred by DMC, NDRSC, and the Ministry of Defence. However, calculating the cost of engaging government staff in all 24 districts during response period was not feasible within the time agreed for the PDNA. Therefore, staff-related cost was not taken into accounting when calculating the losses.

Similarly, funds raised and received for humanitarian response through the emergency-response mechanism and on-going programmes for response were counted as loss. The total recorded expenditure of the UN and NGOs during the disaster has been presented in the table below, and an extended summary can be seen in Annex 7.

Summary of losses to the Government

(Table 86)

Summary of losses to the UN, and national and international NGOs

In addition, below in summary are the expenses incurred by the UN and INGOs related to providing psychosocial support, management of camps and shelters, WASH, education, food security, and nutrition. A detailed list of such assistance is provided in Annex 7. (Table 87)

Emerging risks and vulnerabilities from the May-2017 disasters

A main area of concern is emerging risks, as well as the increase in existing risks as a result of the May-2017 events. Floods and landslides have increased the land exposed to risks, along with the damages caused to the river banks and surrounding areas. Landslides have resulted in new unstable slopes where there were community settlements previously. Further, the events leading to a cascade of disasters in May 2017 have increased the overall risks and vulnerabilities of the affected areas and the inhabitants. There are displaced people and families, and fully- and partially-damaged houses along the paths of flooding and landslides. The impact of the disaster impact has also weakened houses and communities' infrastructure located in surrounding areas which may not have been

TABLE 86: ASSISTANCE PROVIDED BY THE GOVERNMENT

Categories	Total Cost (LKR)
Relief distribution	983,010,925.20
Logistic expenditure for response	11,014,991.34
Initial rehabilitation of key infrastructure	1,667,466.35
TOTAL	**995,693,382.89**

TABLE 87: ASSISTANCE PROVIDED BY UN AGENCIES AND NATIONAL AND INTERNATIONAL NGOS

United Nations	925,304,777
INGOs	341,466,041.1
Total	**1,266,770,818.05**

directly classified as damaged or impacted by the disaster. For example, there are damaged community roads, walking paths, contaminated wells, etc., which have direct bearing on a community's wellbeing and its recovery.

An increase in poverty and vulnerability of the affected families is evident as there has been a reduction of their regular income due to disruption of livelihoods and loss of income. There is continuous uncertainty of livelihood-related recovery for an uncertain period of time with no clear information or assurance of compensation for recovering losses to capital, along with lost livelihoods. For example, most small tea holdings in Matara District are covered with mud and sand which need to be cleaned for revival. Overall wage-labour opportunities from sources such as tea and paddy cultivation are at a halt. Bags of harvested and stored paddy, meant for families' consumption and sales have been washed away. People who have taken loans for production and personal purposes are facing the challenge of the subsequent instalments that need to be paid to lending institutions. The cumulative effects of these factors are likely to push the communities towards further vulnerability. There are also health issues of the survivors that have weakened their capacity to cope with the conditions, and their chance at overall recovery. From a national perspective, there is an overall reduction of stable areas suitable for habitat, and possible losses related to production. From community and social perspectives, there is loss of life of family members (children, parents of young families, bread winners), resulting in massive impacts of physical, psychological, social, and financial nature on the affected people.

Analysis of DRM systems after the 2017 Floods and Landslides

The May-2017 disaster highlighted shortfalls similar to those experienced in May 2016 and captured in the PDNA of 2016, with regard to the DRM status of the country, specifically in areas such as early warnings and dissemination, command and control of the Emergency Operations Centre (EOC), disaster preparedness and response at the local level, and information management and coordination among key stakeholders.

Shortfalls identified in Early Warning Systems (EWS)

- The Department of Meteorology issued an alert on May 15 on the probable intensity of precipitation in the range of 100-150 mm. Proceedings of the Emergency Response Committee (ERC) meeting convened on May 23, 2017 by the DMC, indicate the limited awareness of the relevant authorities on the level of surge capacity that would be required by the extreme levels of precipitation that occurred from May 24, 2017.

- There were no organised and coordinated flood warnings, messaging and or evacuation systems. People received messages about rising waters in an ad-hoc manner, mainly through informal channels, leading

to rumours and giving rise to the reluctance of vulnerable communities to evacuate.

- The collaboration between the Department of Meteorology, Department of Irrigation, National Building Research Organization (NBRO), and DMC to synergise real-time data from the newly-installed networks of automated rain gauges proved inadequate due to gaps in data sharing.

- The VHF Radio communication between EOC and District Units of the DMC was not fully operational due to lack of proper maintenance, monitoring and awareness regarding operability. EOC, therefore, was constrained by an improperly functioning communication system; it was not possible to verify whether EOC communication reached the District and Divisional levels.

- The communication channels of the Office of the Chief of Defence Staff (OCDS) of the Sri Lanka Armed Forces and Police have been in service, filling this gap to a large extent.

- The community-level early warning system established by distributing rain gauges with colour strips to indicate threshold levels of precipitation, to trigger evacuation of individual slopes, had not provided expected safety for slopes which were affected by the landslides. However, the system has been successful during earlier incidents in the Nuwara Eliya District, according to NBRO. It is advisable to investigate the failure of this system in this instance.

Main shortfalls in disaster-related response

- Confirming the gaps in preparedness for response as also mentioned in the 2016 PDNA, search and rescue operations were severely affected due to non-availability of adequate numbers of boats, engines, safety gear, and skilled personnel. There is no evidence of any pre-planning, inventory or drills.

- Many flood-affected people were stranded in their own houses for more than 5 days until the flood waters receded. The reasons for this were many, including lack of early warning regarding flash floods, and the fear of leaving their homes. Also, in several areas, rescue operations were hampered due to lack of equipment, overall poor levels of preparedness, as well as lack of information to the search and rescue teams on the geography and demography of the inundated areas.

- During the emergency, some areas remained inaccessible for the search and rescue teams for several days. The Sri Lanka Air Force could only air-drop relief assistance as there was no place to land the helicopters either to rescue people or to distribute relief. The search and rescue teams were not well prepared or equipped to provide solutions for such complex ground realities.

- A clearly defined chain of command appears to have been lacking at the beginning of the disaster, with several Ministries issuing instructions for emergency operations. The newly-established National Emergency Operations Plan (NEOP) and the SoPs for the emergency response were not activated. Further as was the case during the 2016 flood disaster, another opportunity to operationalize and pilot-test NEOP and SOPs was missed. The non-implementation of the NEOP further fails to identify the strengths and weaknesses in the system.

- Most of the emergency and temporary shelters were setup in temples and schools, which did not have the required basic sanitation facilities, such as toilets, bathing chambers for large numbers of people, resultantly there were critical issues related to hygiene.

- Inadequate coordination and collaboration between NDRSC and the DMC/EOC has also been noted. Maps providing information on safe locations, distribution mechanisms, key ground-level responders and service providers were lacking and/or not utilised.

- Electricity had been shut down within the first few hours of the water levels rising; telephone lines were not working, and road networks had gone under water hampering any communication and access among the local officials, and with the affected communities.

- Data and information gaps, specifically dis-aggregated data prior to the disaster appeared to be a severe bottleneck when it came to providing informed assistance. In many instances, the relief provided was not matching the real needs of the affected people. This refers to basic supplies of food, water, and medicines, as well as the specifically practical needs of women and infants that could not be met. Similarly, limitations were also experienced in areas such as protection and psycho-social support.

- Limited coordination amongst the Government agencies and between the Government and external partners (UN, NGOs, private sector) was observed throughout the response-related operation. Existing national-level coordination platforms such as National Disaster Management Coordination Committee (NDMCC) or Emergency Response Committee (ERC) meetings were not regularly organized to update on the situation, for a more coherent collaboration in emergency response. There is also the situation where members of the service providing mechanisms are not adequately aware about their roles and responsibilities. Accordingly, many actors worked directly with district authorities or relevant line ministries and departments. As a result, the national-level coordination authority was unaware of contributions made by the humanitarian agencies and the private sector.

- In addition to the relief response of the Government, there were substantial efforts from the private sector and the general public to generate assistance, with goods and cash. The Government machinery, however, was unprepared to do an inventory, resulting in wastage and oversupply of certain items. Further, many District Secretaries were faced with situations of looting of relief assistance by organized groups. With large amounts of relief goods arriving to the affected areas in a haphazard manner, many non-victims benefitted while the assistance reaching the real victims was limited.

- The Government did not provide guidelines or standards for relief-assistance when requested by the international community, and thereby, could not exercise control over the relief items received, to ensure that those are suitable for the climatic, socio-economic and environmental conditions of Sri Lanka.

- There are observations of unequitable relief distribution. Several instances have been reported where relief distribution did not reach people away from the main accessible routes. This is applicable for both official relief distribution, as well as relief donated by the general public.

- In many locations, the temporary evacuation shelters were functional for a short period (less than 2-3 weeks), except where the people displaced from landslides and in danger of landslide-related risks were residing. Therefore, many immediate relief assistances planned by different agencies had to be either delayed or cancelled until the exact location of the displaced people was clarified.

Shortfalls in Data, Communication and Information Management

- As highlighted in the 2016 PDNA, gaps in

data continue to be a concern in post-disaster situations. There is no systematic way to generate sex and age disaggregated data on deaths, the number of injured, and those displaced. It has to be noted that the situation reports provided by the DMC with information on deaths and displaced are not disaggregated by sex and/or age. This is a lapse with severe implications on response, recovery, preparedness planning, and overall actions for effective DRM.

- There was no coordinated system for providing updates during the emergency situation. Different Government institutions were demanding situation-related updates from the Divisional and District levels, who were constrained with managing the emergency situation with disrupted infrastructure and services.

- Information management was notably a considerable issue to all stakeholders during the May-2017 disaster. In addition to lack of real-time accurate and sex, age and disability disaggregated data; there have also been inconsistencies in the information flow provided by the DMC and NDRCS. This has led to some conflicting records and reports, on the number of affected or dead.

- The information related to relief-related assistance received from bi-lateral donors directly by the Government of Sri Lanka was not shared among the humanitarian and donor community, which may have resulted in duplication of efforts.

- The mammoth role played by social media in organizing support for emergency response through highlighting the needs and maintaining databases of relief collection centres has been well recognised. A more active role assigned for social media networks by the Government authorities is likely to have resulted in more enhanced emergency response.

11.4. RECOVERY NEEDS AND STRATEGIES

Immediate and short-term needs

- Strengthening Early Warning Systems from National to local level inclusive of last mile dissemination and response planning, addressing the severe gaps demonstrated during the May-2017disaster.

- Strengthening the emergency response preparedness capacity at community level to receive, understand and react to early warnings as well as basic first responder training to build their resilience against future disasters.

- Conducting a lesson learned exercise, including consultations with communities and vulnerable groups such as women, children, elderly and people with disabilities, to understand the strengths and weaknesses of the overall emergency response during May 2017, and to learn lessons for future improvement.

- As stated by 2016 PDNA, the establishment and/or revival of Village Disaster Management Committees (VDMCs) are a priority. Through the VDMCs, the community organization and first responder capacities can be enhanced, including search and rescue, first aid, monitoring, and receiving and responding to early warnings. VDMCs can also improve effective citizens' engagement, particularly women and children, in decision-making processes at the divisional level Disaster Management Coordination Committees.

- Identifying designated relief centres and implementing actions to facilitate their functioning in need, including the role of temples and other religious and communal spaces as safe centres during disaster-related emergencies.

- Establishing a mechanism to provide affected people, specifically displaced people, with clear and coherent information on the relief and recovery schemes, criteria, and other details in a systematic manner. This element was completely absent in the aftermath of the May 2017 disaster.

- Assessing the capacity and training needs of Tri forces in search and rescue; providing them with required gear, equipment, and training.

- Streamlining the engagement of other interested parties such as the media, private sector, philanthropic institutions and the general public in disaster preparedness and response.

Medium-term needs

Regarding Institutions and governance:

- Assessing the roles and responsibilities of relevant institutions including MoDM, DMC, and NDRSC to agree on clear mandates removing any overlaps and areas of non— clarity, including operational, coordination, management and accountability-related aspects, to develop clear SOPs.

- Reviewing and re-visiting the training, awareness and capacity building mechanisms of the main DRM institutions. Assess the effectiveness of the current training and capacity development methods.

- Reviving national and District-level coordination platforms such as NCDM, NDMCC and ERCs, to ensure clear coordination related to disaster preparedness, emergency response and efficient management of information.

- Reviewing the preparedness for response and emergency management planning, coordination and implementation at the District/Divisional/ GN levels to develop a more efficient system of work for DMC, NDRSC, WDO, and Child Protection officials at the local level.

- Operationalising the NEOP to understand its strengths and weaknesses in preparing for the future disasters.

- Developing the shock-responsiveness of the existing social protection schemes to ensure that the safety nets that are available to the most vulnerable groups of people can help in mitigating the future risks of natural hazards and other external shocks.

- Establishing mechanisms and strategies to involve the private sector in practicing disaster risk reduction and mitigation as part of business continuity.

- Establishing triggers and thresholds to declare a National Emergency including standards to request international assistance during such an emergency.

Regarding information and datai

- Further to, and reiterating the recommendation of 2016 PDNA, to close the data gaps of DMC to help in developing a system to generate and update sex, age, disability disaggregated data, their analysis, dissemination and use for informed DRM actions by DRM-designated institutions, as well as other key national planning and sectoral Ministries and agencies. MoDM can consider building on the existing systems such as 'Sahana online IM tool'.

- Reaffirming the central role of the DMC as the disaster management information hub and strengthening the information management system and its capacity.

- Setting up a coordinated system at the national level to provide and update information during emergencies within the access of all stakeholders, including Government authorities and the media. This work can build on the existing initiatives through the above-mentioned 'Sahana on-line system' and with a volunteer team for support.

- Strengthening sub-national level capacities for preparedness and response, and conducting Post Disaster Needs Assessments, considering that the actual management of the situation takes place below the national level. There are several representatives from Ministries such as MoDM, Ministry of Women and Child Affairs, placed at each District and Divisional Secretariat. Their collective capacity needs to be developed, along with programs to utilize the collective capacity for preparedness, response, overall DRM at the sub-national level.

- Revising the currently used DALA data-collection format to rectify gaps identified during the 2017 PDNA. Some of the critical gaps include absence of data related to any of the main cross-cutting issues such as environment, gender, social inclusion, and overall social vulnerabilities.

- Reviving the existing monitoring system to assess the impact of DRR investments/money for value in the long term to strengthen budget allocations for DRR measures.

Regarding the Re-location and land use with 'Build Back Better' principles

- Identifying appropriate, low-risk locations specifically for those displaced; and developing housing designs suitable for flood-prone areas such as building on stilts, an upper story area to secure goods, harvest, as well as for use as a safe shelter during regular floods.

- Re-visiting the designs made available by NBRO in terms of appropriateness and cost in identifying housing designs for the destroyed houses, as well as for all new constructions in high-risk districts.

Long-term needs

Regarding recovery processes

- Conducting Hazard–Risk Vulnerability (HRV) assessments, including basin-level assessments and mapping for high-risk areas, including a system of consistent updating. This can be initiated by way of completion of work initiated by the DMC.

- With National Planning Department and DRM authorities in the lead, using NDMCC and other relevant mechanisms to share and update HRV-assessment information for application in the planning and implementation of sectoral development (Infrastructure, town planning, Irrigation and WM, Agriculture, Education, Environment, etc.)

- Creating a recovery framework as a key DRM measure to identify policies and strategies to be followed during post-disaster recovery, following 'Building Back Better' principles, including land acquisition for resettlement.

Regarding Risk Reduction

- Devising a system for effective implementation of the National Disaster Management Policy and Plan 2018-2022 as called by the Cabinet Paper 17/0321/715/004 (dated March 15, 2017) including progress review, monitoring, and accountability measures aligned with the Sendai Monitor system.

- National Planning Department to lead in coordination and in facilitation with the subject Ministry and agencies for DRM, HRV-informed sectoral development planning, and implementation with specific attention to the observed root causes for the May-2017 disaster (upper catchment area

management, river bank conservation, river pollution, land zoning and construction regulations, urban development, etc.).

- Introducing a mechanism to embed disaster-risk and vulnerability-related information as integral parts of sectoral development's planning and implementation

- Considering climate-related hazards and their impacts that can be aggravated by ill-planned development, developmental failure, and ensuring procedures for rigorous conducting and application of the Environmental Impact Assessment (EIA)/Disaster Impact Assessment (DIA).

11.5. RECOVERY AND RECONSTRUCTION NEEDS WITH COSTS

(Table 88)

11.6. 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 of recovery.

11.7. ASSESSMENT METHODOLOGY

Five districts severely affected by floods and landslides out of the 15 districts were considered in this chapter, in coherence with the overall report, for assessment of disaster impacts and in developing recovery programmes.

Data provided by the NDRSC and DMC on affected districts, people, evacuation centres and relief distribution. The United Nations Resident Coordinator Office provided information about the international cooperation support. Field visits were conducted in order to collect qualitative information about the response and recovery intervention and current needs. Recommendations were made based on the experience of public sector, UN agencies and national and international NGOs.

Flood defence infrastructure maintained by the Ministry of Irrigation was assessed within the corresponding chapter. ■

TABLE 88: RECOVERY NEEDS COSTS IN THE DISASTER RISK REDUCTION SECTOR

DR needs	Short Term LKR. (Mn)	Medium Term LKR. (Mn)	Long Term LKR. (Mn)	Total Cost LKR. (Mn)
Strengthening Early Warning Systems from National to local level inclusive of last mile dissemination and response planning, addressing the severe gaps demonstrated during the 2017 May disaster.	3	5	300	308
Strengthen emergency response preparedness capacity at community level to receive, understand and react to early warning as wells basic first responder training to build their resilience against future disasters	4	8	50	62
Establishment or revival of Village Disaster Management Committees (VDMCs) as a priority.	X	10	15	25
Identify designated relief centers and implement actions to facilitate their functioning in need, including the role of temples and other religious and communal spaces as safe centres in disaster emergency	75	57.2	180	312.5
Establish mechanism to provide affected people, specifically displaced people with clear and coherent information on the relief and recovery schemes, criteria and other details in a systematic manner.	3	2		5
Assess the capacity and training needs of Tri forces in search and rescue, provide the required gear, equipment and training.	5	10	10	25
Conduct a lesson learned exercise, including consultations with communities and vulnerable groups such as women, children, elderly and people with disabilities, to understand strengths and weaknesses of the overall emergency response during May 2017 and to learn lessons for improvement.	0.5			0.5
Streamline the engagement of other interested parties such as media, privet sector, philanthropy and general public in disaster preparedness, response.	3	2	5	10
Institutions and governance:	X	X		
Assess the roles and responsibilities of MoDM and the 4 agencies (DMC, NDRSC, NBRO, DoM) to agree on clear mandates removing any overlaps and areas of non – clarity, including operational, coordination, management and accountability aspects, develop clear SOPs	5	-	-	5
Revive national and District level coordination platforms such as NCDM, NDMCC and ERCs to ensure clear coordination of disaster preparedness, emergency response and efficient information management.	2	3		5
Review the preparedness for response and emergency management planning, coordination and implementation at the District/Divisional/ GN levels to develop a more efficient system of work for DMC, NDRSC, WDO, Child Protection officials at the local level	3	-		3
Operationalize the NEOP including the development of Institutional Disaster Management Plan to understand its strengths and weaknesses in preparing for the next disasters.	2			2
Information and data	X	X		
In order to close the data gaps, DMC to lead developing a system to generate and update sex, age, disability disaggregated data, their analysis, dissemination and use for informed DRM actions by DRM designated institutions as well as other key national planning and sectoral Ministries and agencies.	2	3		5
Reaffirm the central role of the DMC as the disaster management information hub and strengthen the information management system and its capacity.	5	10		15
Set up a coordinated system at the national level to provide and update information in emergencies for the access of all stakeholders including for the government authorities and media.	1	0.5		1.5
Revise the currently used DALA data collection format to rectify gaps identified during the 2017 PDNA. Some of the critical gaps include absence of data related to any of the main cross cutting issues such as environment, gender, social inclusion and overall social vulnerabilities.	2	2		4

TABLE 88: RECOVERY NEEDS COSTS IN THE DISASTER RISK REDUCTION SECTOR

DR needs	Short Term LKR. (Mn)	Medium Term LKR. (Mn)	Long Term LKR. (Mn)	Total Cost LKR. (Mn)
Revise the currently used DALA data collection format to rectify gaps identified during the 2017 PDNA. Some of the critical gaps include absence of data related to any of the main cross cutting issues such as environment, gender, social inclusion and overall social vulnerabilities.	2	2		4
Revive the existing monitoring system to assess the impact of DRR investments /money for value in the long term to strengthen budget allocations for DRR measures.	5	5		10
Re-location, land use with building back better principles	X	X		
Identify appropriate, low risk locations specifically for those displaced;	3	2		5
Develop housing designs suitable for flood prone areas such as building on stilts, upper story area to secure goods, harvest, as safe shelter during regular floods	2	2	2	6
Re-visit the designs made available by NBRO in terms of appropriateness and cost in identifying housing designs for the destroyed houses, as well as for all new constructions for high risk districts	2	1		3
Conduct Hazard – risk vulnerability (HRV) assessments, including basin level assessments and mapping for high risk areas, including a system of consistent updating. This can be initiated by way of completion of work imitated by the DMC.	30	300	200	530
With National Planning Department and DRM authorities in the lead, use NDMCC and other relevant mechanisms to share and update HRV assessment information for application in planning and implementation of sectoral development (Infrastructure, town planning, Irrigation and WM, Agriculture, Education, Environment etc.)	1	2	2	5
Create a Recovery Framework as a key DRM measure to identify policies and strategies to be followed during post-disaster recovery following 'Building Back Better' principles including land acquisition for resettlement		3	3	6
A system for effective implementation of the National Disaster Management Plan 2018-2022 as called by the Cabinet Paper 17/0321/715/004 (dated 15 March 2017) including progress review, monitoring, accountability measures aligned with the Sendai Monitor system	1	1		2
National Planning Department to lead in coordination and facilitation with the subject Ministry and agencies for DRM, the HRV informed sectoral development planning and implementation with specific attention to the observed root causes for the May 2017 disaster (upper catchment area management, river bank conservation, river pollution, land zoning and construction regulations, urban development etc.)		1	1	2
Considering climate related hazards and their impacts can be aggravated by ill planned development, development failure, procedures for rigorous conducting and application of Environmental Impact Assessment (EIA)/Disaster Impact Assessment (DIA).		10	10	20
Total				**1384.5**

12. Gender and Social Inclusion

12.1. EXECUTIVE SUMMARY

Prevailing social and economic inequalities weigh in on how disasters affect people. Women, children, the elderly, disabled persons, and minorities, are often more vulnerable during, and in the aftermath of disasters, due to a combination of factors including those that are of social, economic and institutional nature. In addition to the differential impact, disparities in both vulnerabilities and capacities are decisive factors in the ability of different social groups to recover post the disaster.

According to the Sri Lanka National Human Development Report (HDR) 2017[72], the country falls in the medium gender-equality category, and has the second highest Gender Development Indicator in South Asia. However, this report also notes that the gender gap is greatest when it comes to income.

Institutionally, there is a dedicated Ministry for Women and Child Affairs, and units established at the Divisional Secretariats, consisting of Women Development Officers (WDO), counsellors, and child probation and protection officers, to look into issues related to the wellbeing of women and children. The 2005-2015 Road Map for Disaster Risk Management included strengthening women's rights by reinforcing the fundamental rights in the Constitution, and promoting the implementation of the Women's Charter to ensure a coordinated and inclusive approach to risk reduction and disaster preparedness.

The May 2017 floods and landslides affected 779,819 people, including 401,882 women and 377,937 men, amounting to around 54% of the total affected population. A total of 304,708 households in the five focal districts are headed by women.

The main concerns observed in the aftermath of the May 2017 disaster events include:

- Non-availability of sex, age and disability disaggregated data; systems for data collection and analysis at the national and local levels hampering informed planning, decision making, and in providing appropriate support in pre- and post-disaster situations.
- Gender insensitive space arrangements in temporary shelters which implicated the safety and security of women and children.
- Inadequate support to men, women and children dealing with loss of life of family members and other severe trauma.
- Loss of shelter and associated insecurities, uncertainties and fears related to re-location, and recovery of lost livelihoods.
- Damages to women's and children's spaces— kitchens, toilets, wells and bathing areas; schools, learning spaces and equipment.
- Loss of livelihood, specifically women's self-employment ventures due to damages caused to dwellings and disruption of labour opportunities.
- Overall poor engagement of women in when it came to delivering early warning, preparedness for response both at the community level and at the local officials' level, lapses in drawing on women's capacities in temporary shelter management, and recovery planning.

72. UNDP, Sri Lanka NHDR 2017: Reducing Inequalities: Shared Growth (un-published)

- Lack of consultation by the local-level officials with affected men and women on recovery and relocation-related issues and suggestions.

Issues of compensation related to for recovery for women without proof of asset losses (e.g. wage labourers).

In consideration of the issues of immediate nature in the aftermath of the disaster, along with long-term gender sensitive and socially-inclusive outcomes, deliberate and sustained action should be taken to ensure that gender analysis and social inclusion of recovery needs and issues are carried out, prior to the framing of the multi-sectoral recovery and reconstructions' strategy. Further, in the recovery strategies presented in the 2016 PDNA there are short-, medium- and long-term strategies that have been proposed for consideration within the overall recovery strategy.

12.2. PRE-DISASTER CONTEXT AND BASELINE

According to the Sri Lanka National Human Development Report (HDR) 2017[73], Sri Lanka falls into the medium gender equality category, and has the second highest Gender Development Indicator in South Asia (Maldives is higher at 0.937). Sri Lanka ranks well in several Human Development Indicators; in health achievements such as maternal mortality and life expectancy for both men and women and improvements in educational attainment (particularly in secondary school). Less well ranked are the economic related factors such as low incomes derived by women and low female labour force participation. Sri Lanka HDR 2017 notes that the gender gap is greatest in the dimension of income.

With reference to labour force participation, out of nearly half the working age population which does not participate in the labour market, women make up two thirds of the total number. At the same time, of the total number of workers engaged as contributing family workers, women account for more than three fourths. Unpaid employment is also higher among women across age groups, indicating their marginalized position in the society[74]. It is to be noted that with social and cultural norms demanding women to be principal caregivers, many women prefer self-employment which enables them to manage both household activities and earning an income.

Even with these positive social development indicators, the country's overall level of women gender empowerment is below the average level of developing countries, especially because of the extremely low involvement of women in politics and low female participation in the labour force. Representation of Sri Lankan women in national politics remains low (5.8%) and much lower in provincial and local levels.

As a post-conflict country, Sri Lanka has a considerable number of Female-Headed Households. According to the Household Income and Expenditure Survey, 24.2 percent of all households in Sri Lanka are headed by women, with a majority in the age group of 40-59 years.[75]

With reference to gender-based violence (GBV), as stated in the 2016 PDNA, information from service providers, such as police and non-governmental organizations, indicate significant prevalence of various forms of GBV across the country[76]. While Sri Lanka lacks systematic and national-level data and statistics on GBV, cases reported to police between 2007 and 2013 show an increasing trend in the number of complaints.

The Ministry of Women and Child Affairs has

73. UNDP, Sri Lanka NHDR 2017: Reducing Inequalities: Shared Growth (unpublished)

74. Ibid
75. Household Income and Expenditure Survey, 2011
76. http://www.childwomenmin.gov.lk/resources/30/REPORT.pdf in PDNA 2016

taken a strategic lead in developing a policy framework and national action plan to address sexual and gender-based violence SGBV (2016-2020). The recent stocktaking exercise in July 2017 revealed that there seems to be some serious challenges in undertaking the National Action Plan (NAP) forward.

The National Child Protection Authority (NCPA) was established by the Parliament of Sri Lanka (Act No. 50 of 1998) for the prevention of child abuse, and the protection and treatment of children who are victims of such abuse. National-level data on SGBV in children is not available. However, a study of 353 children presented for medico-legal research revealed that in 339 (96%) cases, the perpetrator was known to the survivor.

There are women's units established at the Divisional Secretariats, consisting of Women Development Officers (WDO), counsellors, child probation and protection officers, to look into issues related to the wellbeing of women and children.

The Policy, Institutional Mandates, and Institutional Development sections of the 'Towards a Safer Sri Lanka: A Road-Map for Disaster Risk Management 2005-2015' include strengthening women's rights by reinforcing the Chapter on Fundamental Rights in the Constitution, and promoting the implementation of the Women's Charter to ensure a coordinated approach to risk reduction and disaster preparedness. The activity is proposed to be led by the Ministry of Disaster Management, along with the Ministry of Women and Child Affairs, the civil society, and labour organizations, as participating agencies, focusing on women's issues. The road map also provides the rationale for making special effort to involve women in Citizens' Committees, and to encourage women's participation in disaster management with reference to local governments.

12.3. POST-DISASTER EFFECTS (DAMAGES AND LOSSES):

Disaster Impact

In the absence of adequate quantitative data, the analysis is based mainly on the qualitative information generated from field assessments, and observation visits. Information on the affected population disaggregated by gender or age is not available. The summary below includes estimates referring to the baseline information of the 2016 Census Department. (Table 89)

Due to the unavailability of data disaggregated on the basis of sex and age, the analysis on the impact of the disaster on girls and boys is also quite limited, which poses the risk of overlooking their specific recovery needs. There is an obvious lack of awareness, and in 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 that there was a general lack of familiarity with, 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 risk of exploitation.

There remain difficulties in getting the accurate number of separated, unaccompanied, orphaned, dead, and injured children, as a result of the disaster. The Department of Probation and Child Care Services has already instructed their officers to collect this information. Based on the report of the Probation Department, shared during a child-protection emergency coordination meeting at the Ministry of Women and Child Affairs, thus far, 4 orphaned children were identified and are living with their relatives. 24 children lost one parent and are currently living with their remaining parent. The Probation Department is providing LKR 2000

TABLE 89: AFFECTED POPULATION BY SEX

District	No, of affected persons				No, of persons in Relief Camps			
	Male	%	Female	%	Male	%	Female	%
Galle	76,034	47.91	82,659	52.09	509	47.91	554	52.09
Rathnapura	115,948	49.30	119,249	50.70	23,202	49.30	23,862	50.70
Kalutara	93,103	48.37	99,361	51.63	6,622	48.37	7,067	51.63
Matara	87,714	47.93	95,294	52.07	5,639	47.93	6,127	52.07
Hambanthota	5,138	49.14	5,319	50.86	97	49.14	101	50.86
	377,937		**401,882**		**36,070**		**37,710**	

per month for all 28 children as a grant for the next 6 months, commencing from July 2017.

It was also evident that during initial phase of 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 prioritized. 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. Some of the children lost their parents, siblings and relatives during this disaster. Very few organizations, such as Save the Children, World Vision, Child Fund, and UNICEF, are engaged in activities that focus on the psychological well-being of the affected children. Children also reported as 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 effort related to disaster-risk reduction, either at the community level or in schools as part of school-safety planning.

Key concerning issues

Following are main issues concerning women and children encountered during the emergency, in displacement and in early recovery:

No early warning /pre-warning:

The flood and landslide-related emergency situation arose without any pre-warnings and information. It should be noted that women and children have less access to information, added to the fact that when it comes to use of mobile phones, they account for a low percentage of users.

Dealing with losses and trauma:

Children and women have been dealing with the overall impact of the disaster, shock, losses and trauma, when there are substantial damages and losses to the homes and household items, including kitchen utensils, bedding, clothes, and disruption of home-based livelihood.

Dealing with loss of life of family members and trauma — spouses, children, grandchildren, parents, relatives, etc. in some cases, bodies have not been found in order to complete the last rites.

There has been an overall increase in the status of vulnerability — health issues, loss of livelihood, and uncertainty of recovery, and/or relocation.

Some children lost their parents, siblings and relatives during this disaster. The psychological well-being of the affected children is a concern.

Specific needs of women and children during emergency:

Immediate needs include sanitary items and underwear, infant care and related requirements –

- The continuing of care-giving functions

while in displacement, household cleaning and recovering household damages from floods.

- There is the need for psychosocial support, and psychosocial first-aid, for children who have lost loved ones, and those children who are displaced and living in difficult and stressful conditions.

- There is the risk of limited access to the most basic services of water and sanitation, as well as food commodities, along with already high levels of acute and moderate poverty, resulting in the high risk of malnutrition.

Security and privacy of women, girls, and young children while in displacement:

- Field-visit reports to camps indicate that there is a lack of attention by poorly-trained camp management officers (no minimum standards observed in temporary shelters) to issues such as:

- Accessing safe and segregated toilets, bathing areas in temporary shelters

- Privacy for women and female children (for example, proper partitioning)

- Safety and protection (for example, lighting at night/in toilets)

- Temporary shelters had to accommodate many facilities within limited space, in some occasions tents provided had zippers and locks from outside.

- Safe spaces for children to play and study. The disruptions of schooling, and loss of school books and materials, are added sources of stress to children and their families.

- The protection and safety of all children in the camps should be given more concern. There is an urgent need make sure that adequate camp safety officers are available in the camps, particularly female officers, as well as to establish monitoring and reporting mechanisms for children that are at-risk or victims of abuse and violence, so that they can receive appropriate care and protection services. It is highly recommended to conduct more general awareness amongst those living in the camp, so that they may be vigilant on issues of child abuse and violence, and in the reporting of related incidents to relevant authorities in the camp.

- Temporary shelters had to accommodate many facilities within limited space, in some occasions tents provided had zippers and locks from outside.

- There were no minimum standards observed in temporary shelters.

Accessing information and opportunity for consultation

- Women and children are not consulted or engaged in planning camp management. There are no opportunities to contribute and or express any concerns.

- There is lack of information on recovery assistance, relocation plans and related issues. Women cited that officials do not share any information and both women and men were not consulted by the officials.

- Personal identification documents including birth and marriage certificates were lost, and no death certificates were issued for those deceased (at the time of this report).

Loss of assets

- There has been loss of houses and household assets, self-employment related assets and equipment.

- Those affected have been dealing with business recovery issues, and recovering lost livelihoods.

- Moreover, those who have faced the loss of paddy stocks are dealing with food security, and the burden of accessing food to compensate for loss of stocks.

Productive Sectors

- In the affected districts, women's contribution to the productive sectors is predominantly through informal production and care-giving services, home-based production activities, micro enterprises, and wage labour. This scenario reiterates the analysis and account presented in the PDNA of 2016. The main livelihoods are paddy cultivation, tea holdings, and tea estate-related daily labour, dealings in spices — specifically cinnamon, small and medium businesses — mostly food and snacks' sales, tailoring of garments, small boutiques, and other daily labour work.

- The 2017 floods and landslides have resulted in considerable loss of self-employment ventures: assets such as food-preparation utensils, machinery and furniture, and raw material, etc. With the damages and destruction to homes and household items, those who were self-employed are in need of complete revival.

- Small tea holdings, home gardens, fruit and vegetable cultivations, mostly carried out by women, are covered with mud and sand, requiring cleaning and re-planting in most cases.

- Due to the overall halt in production activities where women were pre-dominantly engaged in, and due to displacement, wage labour opportunities were practically non-existent at the time of this report.

- The main livelihoods for men are paddy cultivation, small-tea holdings, and daily wage work. Similarly, production activities are at a halt resulting in non-availability of wage work. Under these circumstances families continue to depend on relief, dry rations, etc.

- While losses to the livelihoods and related assets are being assessed, there is no clarity on how they will be compensated. There was an immediate aid of LKR 10,000 provided to all affected households, given to the Head of the Household, for the purpose of cleaning and repairs.

- Ministry of Women and Child Affairs (MoWC), through Women Development Officers (WDOs), and the Rural Development Ministry, is collecting information on lost livelihood activities, for consideration for providing grants for revival. MoWC has launched a programme worth LKR 75 million to provide livelihood-revival support to fully- and partially-damaged enterprises, as well as to support women for income generation, with the aim of their empowerment, in the aftermath of May 2017 disaster events. The programme covers 44 Divisional Secretariats in the 5 disaster-affected districts, implemented with the Women's Bureau under the MoWC, and Divisional and District Secretariats in the five districts.

- The immediate needs, specifically for women who are engaged in home-based livelihoods, include low interest or soft loans to recover and re-start. There is, however, the issue of existing loans, for which no consideration or grace period has been given due to the flood situation. The Oxfam Rapid Gender Analysis Report, conducted in Ratnapura and Matara districts, states that indebtedness is higher among women, as women are generally prioritised under micro-credit schemes with fairly high rates of interest, including government schemes such as Samurdhi.

- Another specific concern to be noted, is that the Government support schemes take into consideration the estimation of loss of as-

sets (with the certification of Grama Niladhari, WDO), for extending compensation and livelihood revival grants. Those who are without assets and depend on wage labour, and those working in tea factories etc., are in one of the most vulnerable categories. However, they are not supported through such schemes.

Infrastructure

The only available data on the impact on infrastructure is on water and sanitation infrastructure as revealed in rapid assessment reports.

Most of the water systems in the communities were destroyed and contaminated, toilets, and bathing facilities, were damaged. While wells were cleaned through the Public Health Inspector (PHI) system soon after floods receded, communities do not feel well water was clean enough for drinking. There was dependency on bottled water where there was access, or people resorted to boiling well-water several times before consumption.

WASH facilities in temporary shelters, and in welfare centres were insufficient and below SPHERE-minimum standards. The specific reference here, has been made to fewer numbers of toilets (in some cases there was only 1 toilet for 20 families), as well as bathing areas, compelling women and children to go to the bush jungle.

Focus Group Discussions in Galle highlighted that communities did not have access to boat transport during the floods.

Social sector

Losses and damages to houses and displacement severely implicate the safety, security and stability for all, specifically women and children on many accounts. Existing household arrangements and related gendered division of labour prescribes that among women's core responsibility, is maintaining clean and comfortable households for family, and the overall care-giving role. Further, for most women in the disaster-affected districts, livelihood and income generation activities of various scales are also home based in nature. The loss of home and workplace, therefore, increases their vulnerability. A secure shelter is of critical importance in maintaining the personal autonomy of women and children, and its absence generates a situation of prolonged crisis.

The 2017 floods and landslides have damaged over 77,000 houses according to the estimates. Kitchens and cooking utensils, toilets and bathing areas have been damaged, thereby ushering in new risks and vulnerabilities for women and children. It has also been noted that a significant number (over 20%[77]) of households are female headed (FHH), which demands consideration for added elements of vulnerability. The current system follows the Head of the Household as the main benefactor for all forms of compensation, land re-allocation, etc. There is no sufficient information to analyse how this will affect women accessing such benefits.

A number of issues related to schooling, while families remain in displacement, demand attention. Schools, including pre-schools, suffered from damage and losses to buildings, to teaching aids and instruments. A number of schools were utilised as temporary shelters. There are school children who lost their parents, siblings and family members, and who are suffering from the trauma of loss and displacement. They are in need of long-term counselling and psycho-social support. While schools were reopened, and school kits containing uniforms and books were distributed for displaced kids to attend school, the overall disruption requires further consideration. For example, there are both girls and boys, who are going to appear for their GCE/ AL and OL exams in the following months, for whom, this disruption will have stronger implications. Mothers in temporary shelters also expressed concern about the level

77. DMC/NFRDC in PDNA 2016

of nutrition young children were getting while in displacement. While meal requirements were met, it was not possible to provide the children with mid-day meal menus, as requested by schools.

The Ministry of Women and Child Affairs has initiated a post-disaster psycho-social advice programme, starting with Ratnapura District, targeting affected children and women, especially those who are traumatized. The programme also aims to identify and support children who require such support on a long-term basis. The implementation team includes representatives from the Department of Probation and Child Care Services, National Child Protection Authority, Children's Secretariat, and the National Committee on Women.

Protection Issues

Several protection issues have been observed, summarized as below.

Overall, poorly-planned temporary shelter coordination and management processes, have been observed in the affected districts. Safety-related risks for women, children and other at-risk groups are compounded by factors such as lack of adequate WASH facilities meeting the minimum standards in camps and welfare centres, poorly-lighted alleys and pathways leading to latrines, lack of inside zips for those living in blue tents, and absence of proper mats for those sleeping on floors. Due to lack of adequate numbers of latrines, women and children in some instances opted to go to the bush jungle, which also can invite risk to the person. This was a common occurrence in Ratnapura, Matara and Kalutara. As mentioned, SPHERE minimum standards were not adhered to, which can affect the privacy, safety and security of women and children. This can heighten risks of gender-based violence (GBV), and violence against children, in several ways.

Discussions in Focused Groups in all districts, observations and discussions including with WDOs, however, confirmed that there were no incidents of harassment or GBV in the temporary shelters. On the contrary, women in temporary shelters expressed that men in the affected community provided them with protection in the adverse conditions, guarding the shelter, and respecting their privacy in toilets and bathing areas.

The unavailability of age and sex desegregated data created a significant setback in child- and women-focused specific interventions.

Loss of vital registration documents in the floods became an issue for displaced persons when it came to effectively accessing basic social services and compensation. While this was common for both men and women, for women-headed households, it added further complications when it came to proving their status.

The protection and safety of all children in the camps has been raised as a concern. While in some shelters, there was the presence of the WDO and the Child Protection officers, this was not the case for all shelters. While the importance of including female officers in temporary shelters is well accepted, WDOs being female in most cases were not included in the initial teams which attended to the emergency. Further, the scarcity of trained Child Protection Officers in camp management and emergency support has also been noted.

12.4. RECOVERY NEEDS AND STRATEGIES

Deliberate and sustained action should be taken to ensure that a gender analysis and social inclusion of recovery needs and issues are carried out, prior to framing the multi-sectoral recovery and reconstructions' strategy. Further, in line with the recovery strategies presented in the 2016 PDNA (p. 202-203), the following are proposed based on the rapid assessment of the 2017 May disaster events.

Immediate and short-term needs:

- Provide information, consult and engage women and children on recovery, re-location.

- Consider the establishing of temporary shelter-management committees engaging affected people, ensuring to include women, and providing training on child-friendly camp management.

- Include the participation of women in emergency response with a view to make this a regular practice.

- Include female officers in camp-safety management teams.

- Establish child-friendly spaces, and Women-friendly spaces (as needed) in long-term shelter locations.

- Pay special attention to the needs of children with disabilities.

- Ensure that adequate camp safety officers are available in the camps, particularly female officers, as well as to establish monitoring and reporting mechanisms for children that are at-risk or victims of abuse and violence, to support them with appropriate care and protection services.

- Support the care-giving role of displaced women with adequate aid (sanitary, clothes and other material) and appropriate friendly spaces.

- Provide for more recreational activities for children in camps to promote social skills, peer support, team play, and leadership skills amongst adolescents.

- In areas of return, establish children's clubs/networks to continue providing psychosocial support; facilitating child and adolescent engagement and participation, and identifying and addressing child-protection issues that may arise.

Short-to Medium-term needs:

Data and information

- Set up a system in coordination with the National Census and Statistics to collect sex, age and disability dis-aggregated data.

- Standardize the data-collection formats used for baseline, emergency and post-disaster needs.

- Build the awareness and capacities of relevant national, district and divisional-level officials to collect dis-aggregated data.

- Conduct gender analysis to spread information on the recovery-related strategies in all sectors; productive and social.

- Support the Probation Department to put in place an effective system that:

i) identifies, registers and maintains records of children who live in camps and those who have been separated / unaccompanied / orphaned (if any);
ii) provides appropriate response mechanisms and psychosocial support;
iii) facilitates placement of children with caregivers/relatives keeping in mind their best interests; and
iv) supports tracing and reunification of these children back with their families, where possible

Housing and re-location

- Engage affected women in re-location planning discussions.

- Consult women in housing designs; ensure cooking spaces, latrines, and garbage disposal arrangements meet the practical and

safety requirements.

- As a disaster risk reduction measure, consider home-based income generation activities and enterprises in housing designs to safeguard against future losses.

Temporary shelter/safety

- While there are no/or few incidents mentioned, it is important to maintain minimum standards for safety and security. Build the capacity of relevant officials of MoDM, MoWC, District and Divisional Authorities, etc., on SPHERE minimum standards in emergency and temporary shelters, and take measures for implementation of minimum standards by introducing relevant policies and directives.

- Set up a system to enable access to immediate relief items such as sanitary aid and underwear for women, and requirements for infants, using baseline data without awaiting real-time data on the emergency (items required in the first 24 hours of an emergency).

- Implement the existing NCPA Child-Friendly Spaces (CFS) guidelines, child-friendly camp management guidelines, and guidelines for volunteers and aid workers working with children.

- Set up women-friendly spaces in line with the guiding principles such as empowerment and leadership, survivor centred spaces, safe and accessible locations, to ensure women can access safe gathering spaces, further reducing their risks and vulnerabilities.

- Set up vigilant teams within the community for safety and security with specific functions. Build their awareness on the key issues related to women's and children's safety, and security.

- Deploy Child Protection Officers and trained volunteers, who can provide basic psychological first-aid for children living in the camps, and facilitate referrals to more specialized services when required.

- Include women officers and community representatives in the discussions for pre-planning emergency shelters (through village- and divisional-level committees).

Coordination at the district and divisional levels

- To address considerable gaps of coordination at the local level, and for ensuring gender and social inclusion measures, divisional and district level officers from varying Ministries (MoDM, MoWC, MoE, Child Protection Authority, Samurdhi, EDO etc.), are to be organized into a core team to function in planning for early warning, preparedness for response, emergency management and early recovery.

- Specific attention is drawn to the need for stronger coordination between the NDRSC, DMC, and MoWC officials at the divisional and district levels, with a view of engaging MoWCA with a stronger role, with equal authority for more efficiency, as well as to address currently existing divisions.

- Revive and strengthen Village/Grama Niladhari-level committees for regular floods' and landslides' preparedness, ensuring the inclusion of women in community-level preparedness, early warning and response.

Livelihoods recovery and support

- Assess the financial status of women entrepreneurs for potential debt, when i providing livelihoods' assistance, and take appropriate action for different groups in

providing livelihood-recovery assistance, and pay specific attention to female heads of households.

- Instil measures for debt nullification for SMEs, and female-headed households which are severely affected.

- Introduce insurance schemes for potential future losses of livelihood assets, and build awareness on protecting income generating sources/business from flooding.

Medium-to long-term needs:

- Conduct awareness building and training on gender inclusion and Sphere Standards for all governmental and non-governmental stakeholders, actively engaged in the emergency response.

- Prepare checklists, and simplified guidelines in local languages on how to address gender, children, and social inclusion issues in disaster risk management covering preparedness, emergency, response and recovery.

- Use the forum of National Disaster Coordination Committee (NDMCC) for awareness building of DRM stakeholders on gender and social inclusion.

- Include gender and social inclusion-related key indicators in the national indicators of progress of the Sendai Monitor. Identify data requirements to monitor accountabilities for reporting.

- Advocacy with relevant authorities to relocate the existing schools and pre-schools in high landslide risk areas, or take appropriate mitigation measures to minimize future landslide risks to ensure the safety of children.

- Undertake replacement of lost documents rapidly to minimize restrictions when it comes to children attending schools or school registration for the next year (birth certificates, lost notes/text books, etc.).

- Engage in rapid rehabilitation of education facilities, including WASH infrastructure, which were damaged, to ensure continuation of education.

- Create awareness and build the capacity of students within the already-affected schools to take on possible threats to their lives, and build their preparedness capacity.

- Put in place guidelines and mechanisms to monitor, and report, instances of abuse and exploitation.

- In areas of return, support the establishment of children's clubs/networks in affected communities to continue providing psychosocial support.

- Facilitate children's and adolescent's engagement and participation.

- Identify and address child protection issues that may arise.

Long-term needs:

- Analysis of dis-aggregated data and their application as a mandatory element in the National Disaster Management Policy and Plan 2018-2022.

- Comprehensive School Safety to be mandatorily implemented, and be part of all educational activities including pre-schools and technical institutes.

- Develop policies and enact directives for husband and wife joint ownership of land, and houses at the times of relocation.

- Liaise with the National GBV Forum, Ministry of Women and Child Affairs, to raise

current protection issues, and collaborate to support the Disaster Management Ministry in implementing the Policy Framework and National Action Plan to address SGBV. Pay specific attention to Ratnapura district, where according to Police reports, cases of violence against women is high.

- Establish long-term capacity on child-centred disaster risk reduction, and establish trained staff capacity on child-friendly camp management to ensure quick deployment.

Recovery and re-construction needs with costs (See table 90)

12.5. IMPLEMENTATION STRATEGY FOR RECOVERY

The Ministry of Disaster Management and the Ministry for Women and Child Affairs will lead the recovery, in coordination and partnership with the National Planning Department. UN agencies and partners, international and national NGOs, and development partners and donor agencies, will support the implementation of the recovery plan led by the Government in accordance with the 'Build Back Better' principles. The review, monitoring and indicators of progress will be aligned with the indicators and reporting processes of the SDGs, and Sendai Framework for Disaster Risk Reduction.

12.6. ASSESSMENT METHODOLOGY

This chapter utilised both primary and secondary data sources. Published and un-published existing documents were used specifically to capture the pre-disaster status. Primary data; both qualitative and quantitate; were gathered through Focus Group Discussions with women and men in the affected districts, guided by questionnaires and checklists, interviews with the District and Divisional-level officials in Ratnapura, Matara and Galle districts, and through visits and group discussions at the temporary shelters. Additional visits to selected locations in Galle and Ratnapura districts were carried out to gather supplementary information to address data gaps. Primary data was also accessed from the gender assessment carried out by OXFAM in selected villages and camps in Matara and Ratnapura districts. Special discussions on the aftermath of the disaster events held with the media and the private sector also provided qualitative information. ■

TABLE 90: RECOVERY NEEDS IN GENDER SECTOR

#	Gender and social inclusion needs	Short Term (LKR) Mn	Medium Term (LKR) Mn	Long Term (LKR) Mn	Total Cost (LKR) Mn
1	Provide information; consult and engage women on recovery and re-location.	0.25			0.25
2	Consider establishing temporary shelter management committees engaging affected people, ensuring to include women.	X			Covered under item 1 above
3	Include the participation of women in the emergency response with a view to make this regular practice.	0.5	0.75		1.25
4	Include female officers in the camp safety management teams. Establish child-friendly spaces (as needed) in long-term shelter locations.	X			Covered under item 1 above
5	Establish child-friendly spaces (as needed) in long-term shelter locations.	0.25	0.25		0.5
6	Establish women-friendly spaces (as needed) in long-term shelter locations.	0.25	0.25		0.5
7	Ensure adequate camp safety officers are available in the camps, particularly female officers and establish monitoring and reporting mechanisms for children that are at-risk or victims of abuse and violence to support with appropriate care and protection services.		X	X	No additional cost required
8	Support the care giving role of displaced women with adequate requirements (sanitary, clothes and other material) and appropriate friendly spaces.				Covered under relief assistance
#	**Short to medium term: Data and information**				
9	Set up a system in coordination with the National Census and Statistics to collect sex, age and disability dis- aggregated data.	0.05	0.05		0.1
10	Standardize the data collection formats used for baseline, emergency and post-disaster needs.				Covered under item 7 above
11	Build the awareness and capacities of relevant national, district and divisional level officials to collect dis-aggregated data.	0.5	0.5	x	1.0
12	Conduct gender analysis to inform the recovery strategies in all sectors; productive and social.	0.35	0.5	X	0.85
13	Provide for more recreational activities for children in camps to promote social skills, peer support, team play, and leadership skills amongst adolescents.	0.5	0.5		1.0
14	In areas of return, establish children's clubs/networks to continue providing psychosocial support; facilitating child and adolescent engagement and participation, and identifying and addressing child protection issues that may arise.		0.75		0.75
#	**Housing and relocation**				
15	Engage affected women in relocation planning discussions.				No additional cost required
16	Consult women in housing designs; ensure cooking, latrines and garbage disposal arrangements meet the practical and safety requirements.	0.05			0.05
17	As a disaster risk-reduction measure, consider home based income generation activities and enterprises in housing designs to safeguard future losses.				Covered under item 12

TABLE 90: RECOVERY NEEDS IN GENDER SECTOR

#					
	Temporary shelter/safety				
18	Include women officers and community representatives in the discussions for pre- planning emergency shelter (through village and divisional-level committees).				Costs included under the DRR recovery needs
19	Advocate with NDRSC to include the below procedure and make budget allocation: Set up a system to enable access to immediate relief items such as sanitary aid and underwear for women and requirements for infants, using baseline data without awaiting real-time data on the emergency (items required in the first 24 hours of an emergency).				To be covered under emergency relief goods
20	Build the capacity of relevant officials of MoDM, MoWC, District and Divisional Authorities, etc., on SPHERE minimum standards in emergency and temporary shelters and take measures for implementation of minimum standards by introducing relevant policies and directives.				Costs included under the DRR recovery needs
21	Implement the existing NCPA Child-Friendly Spaces (CFS) guidelines, child-friendly camp management guidelines, and guidelines for volunteers and aid workers working with children.		0.75		0.75
22	Set up vigilant teams within the community for safety and security with specific functions, build their awareness on the key issues related to women's and children's safety and security.		0.5		0.5
23	Deploy Child Protection Officers and trained volunteers who can provide basic psychological first aid for children living in the camps and facilitate referrals to more specialized services when required.		1.0		1.0
#	**Coordination at the district and divisional levels**				
24	To address considerable gaps of coordination at the local level, and for ensuring gender and social inclusion measures, divisional and district-level officers from varying Ministries (MoDM, MoWC, Child Protection Authority, Samurdhi Officers, etc.) to be organized in to a core team to function in planning for early warning, preparedness for response, emergency management and early recovery.		0.15		0.15
25	Specific attention is drawn to the need for stronger coordination between the NDRSC, DMC, MoWC officials at the divisional and district levels with a view of engaging MoWCA with a stronger role, for more efficiency as well as to address currently existing divisions.				No additional cost required
26	Revive and strengthen Village/Grama Niladhari-level committees for regular floods and landslide preparedness, ensuring to include women in community level preparedness, early warning and response.				Costs included under the DRR recovery needs
#	**Livelihoods' recovery and support**				
27	Assess financial status of women entrepreneurs for potential debt in providing livelihoods assistance and take appropriate action for different groups in providing livelihood recovery assistance, pay specific attention to female headed of households.	0.175			0.175
28	Instil measures for debt nullification for SMEs, female-headed households which are severely affected: funds to be allocated.	25	50		75

TABLE 90: RECOVERY NEEDS IN GENDER SECTOR

29	Introduce insurance schemes for potential future losses of livelihood assets, build the awareness on protecting income generation/business from flooding.	0.05	0.05		0.1
#	**Medium to long term**				
30	Conduct awareness building and training on gender inclusion and Sphere Standards for all governmental and non-governmental stakeholders actively engaged in the emergency response.				Costs included under the DRR recovery needs
31	Prepare checklists, simplified guidelines in local languages on how to address gender, children, social inclusion issues in disaster risk management covering preparedness, emergency, response and recovery.	5	5	5	15.0
32	Use the forum of National Disaster Coordination Committee (NDMCC) for awareness building of the DRM stakeholders on gender and social inclusion. Include gender and social inclusion-related key indicators in the national indicators of progress of the Sendai Monitor. Identify data requirements to monitor and accountabilities for reporting.	0.5	0.5		1.0
		33.425	**61.5**	**5**	**99.925**

Annexures

Housing, Land and Settlements

Lead Agency
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Co-Lead Agency

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Post Disaster Needs Assessment (PDNA) Scope and Methodology

Background

Sri Lanka is highly vulnerable to natural hazards like floods and landslides which represent a significant risk to inhabitation and economics in the region. On May 25 and 26, 2017, fifteen (15) districts in Sri Lanka was affected by incessant heavy rains brought on by the southern monsoon triggering flooding, landslides and heavy winds. About 879,778 people have been affected in the aftermath of the disaster, with 219 dead, 154 injured and 74 people reported as missing. Overall, 1,162,355 houses were affected, of which 3,008 houses were fully destroyed, while another 74,301 houses were partially damaged. At the peak of the floods and landslides, 109,890 people were temporarily relocated to 504 safe locations. According to the estimations, at least 150,000 of the total number of affected people are women and girls of reproductive age, and over 189,000 children are threatened by the effects of the disaster in the affected districts. Of these districts Galle, Matara, Kalutara, Rathnapura, Kegalle and Colombo were the highly-affected districts.

Government Response and General Coordination

In the immediate aftermath of the flood and landslides of May 2017, the Disaster Management Centre, with the support of the Tri Forces and the Police, started search and rescue operations to rescue and evacuate the stranded people and direct them to safety centres established in the safe areas. The Government's relief provision effort was led by the National Disaster Relief Services Centre, under the Ministry of Disaster Management, and was fully supported with large quantities of food and non-food items donated by the general public, various government and non-state actors including the media. The government has granted LKR 166 million as flood and landslide relief in the form of initial support to the affected districts to be utilized to meet the immediate relief-related needs of the affected people.

Request for assistance for the PDNA

The Ministry of Disaster Management, Government of Sri Lanka, requested the UN's support to conduct a PDNA. The assessment will be led by the Ministry of Disaster Management (MDM) and Ministry of National Policies and Economic Affairs (MNPEA), and will be undertaken with the assistance of the European Union, the World Bank, United Nations agencies, and other relevant agencies and partners.

Objectives of the PDNA

The PDNA will be an assessment of the impact of the floods and landslides in the 5 key affected districts in Sri Lanka with special focus on the most vulnerable communities.

The main objectives of the PDNA are to:

1. Estimate the overall impact of the May 2017 floods and landslides focusing on the 5 affected districts in the country.

2. Assess the physical impacts of the disaster, in order to develop a Recovery and Reconstruction strategy (RRS) presenting the early, medium and long-term recovery and reconstruction strategies, along with costs and a timeline in one consolidated report, with emphasis on the most vulnerable communities.

3. Ensure that strategies for recovery integrate concepts of disaster risk reduction, including 'Build Back Better', identify the 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-related and environmental concerns.

4. Provide recommendations for strengthening strategies for flood-risk management and landslides' management in the country.

5. Assess the status of the most vulnerable communities; those affected by landslides in Sabaragamuwa, and Southern and Western Provinces.

6. Recommend institutional mechanisms and policy options to be undertaken in support of the recovery and reconstruction processes that promote long-term disaster resilience in the country.

7. Provide suggestions to help strengthen the capacities of the Ministry of Disaster Management, including the Disaster Management Centre.

PDNA Deliverables

The PDNA report comprised of the following:

- An impact and needs-based assessment for each selected sector (sectors to be decided in consultation with MDM, MNPEA and relevant sector ministries).

- A recovery and reconstruction-related 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 landslides' management in the country.

Coordination of the PDNA

The PDNA exercise will be led by the Government of Sri Lanka —by the The Ministry of Policy Planning and Economic Affairs, and the 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.

Methodology summary

The PDNA includes the collection of pre-disaster baseline data to compare with post-disaster conditions in order to evaluate the disaster's 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 organizations and academic institutions. University of Colombo will be involved in data collection, tabulation, analysis and also in the compilation of the draft document.

As such it combines quantitative data with qualitative information and analysis, to assess the impact of the disaster and develop a framework for recovery. The assessment will build on secondary data available from State and Local Governments, and from existing or on-going humanitarian/sectoral assessments which can 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. Planning workshop: This will take place in early July to share and explain templates in particular to the all governmental ministries and institutions and UN and other stakeholder agencies, who will support the government, so that baseline and damage-data collection is done based on the requirements of the templates. At this workshop, sector leaders, co-leaders and supporting agencies will be identified and roles and responsibilities will be defined.

2. Preparatory and Desk Review Phase: To include initial desk reviews to collect baseline information, determining the scope of the respective sector-wide reviews, identifying information gaps, preparing data-collection templates, and identifying and rapidly hiring 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-related data.

3. Analytical Work and Sector Strategic Reviews: When most of the damage-related data is available, sector-wise teams will be mobilised to visit the affected areas to consult with State and Local Government authorities, the public/community's representatives, NGOs, UN agencies, and other stakeholders, as well as to 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 the review and analysis of the data by sectoral/core teams to prepare the draft sector reports.

4. Final consultations and report writing: Upon the completion of data collection and analysis, the sector-wise teams will write sector-related reports, and consultations with key stakeholders will be held to prioritise recovery-related strategies and costs. Other details of the work, like ensuring that cross-cutting issues are addressed and double counting is avoided will be looked into. Also, the validation of recovery and reconstruction-related needs will happen at this stage.

5. Presentation of findings and Final Report dissemination

Time frame for the Assessment

The timeframe of the scheduled activities of the PDNA is given below. (Table 91).

Scope of the Assessment

The assessment may cover 5 key districts affected by the flooding and landslides with special focus on vulnerable groups and may include the following sectors. (Table 92)

Management and Coordination arrangements

Coordination structures to be put in place to guide the PDNA exercise include:

High-level Management Team

Senior officials of MDM, MPPEA and UN, World Bank and EU 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 and Sector Team

The coordination and Data Management team for the PDNA will 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 coordination team is as follows:

- Complete the identification of participants for the PDNA and confirm availability.

Activity Completion Date

TABLE 91: THE TIMEFRAME OF THE SCHEDULED ACTIVITIES OF THE PDNA

SN.	Activity	Dates
1	Meeting at Ministry of National Policies and Economic Affairs, Ministry of DM and relevant Agencies	Friday, June 23, Morning
2	Meeting with Secretary and other officials, Ministry of Disaster Management	Friday, June 23, Afternoon
3	Meeting students of University of Colombo to familiarize with the formats –NPD, DMC and identify sector agencies and officials	Tuesday June 27, Morning
4	Meeting with NPD, DMC to agree on formats to be used for data collection	Tuesday June 27, Afternoon
5	Preparations: University students to familiarize themselves with data collection formats and process of data collection	June 28 and 29
6	Planning workshop for all stakeholders: Additional Secretary of the relevant Ministries, Nominated persons for data collection, UN Agencies, WB, EU, university students and others; agree on sectors, districts, data collection formats, reporting formats, process	July 3
7	Field-data collection	July 4 – 10, 2017
8	2-day workshop for data compilation, analysis and getting ready for presentations – Sector Teams, university students	July 11 and 12, Morning
9	Presentation to sector teams/stakeholders for feedback	July 12, Afternoon
10	Sector teams start writing the chapters	July 13 onwards
11	Preparatory work for presentations/ address comments	July 13
12	Presentations to stakeholders – NPD, Local Government Authorities, Private Sector, Media, NGO's for feedback	July 14th – 31
13	Development of chapters by sector teams	July 17 – 31
14	Compilation, writing the executive summary and develop draft Report	14th – 15th Aug
15	Presentation to the Government/ Stakeholders	August 22

TABLE 92: INITIAL LIST OF PDNA CONTRIBUTIONS – AGENCIES

Sector	Lead Agency	Co-lead Agency	Contributing Agencies
Social Sectors			
Housing	Ministry of Housing and Construction	UNHABITAT	NDRSC, NBRO, Ministry of Hill Country New Villages
Health	Ministry of Health		
Education	Ministry of Education	UNICEF	ADPC
Productive Sectors			
Agriculture, Livelihood and Fisheries	Ministry of Agriculture	WFP	FAO
Industry and Commerce	Ministry of Industry and Commerce	UNDP	ILO
Infrastructure Sectors			
Irrigation	TBC	World Bank	
Water and Sanitation	Ministry of City Planning and Water Supply	World Bank, UNOPS	UNICEF
Transport	Ministry of Highways and Higher Education	World Bank	
Power Supply	Ministry of Power and Renewable Energy		
Cross Cutting Issues			

• Collect and 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.

• Facilitate logistical arrangements of mission-related activities (venue, field trips, etc.).

• Provide technical guidance to the assessment, and report to the high-level management team.

• Organise consultations required for the PDNA developmental process and for the finalisation of the recovery-related strategy.

• Facilitate the high-level meeting to present the outcome of the assessment report.

Reporting Team

The function of the reporting team is as follows:

• Review sector chapters/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.

Develop the executive summary and annexures of the final PDNA report.

Edit the chapters and ensure that the text of the assessment report/recovery framework is consistent, clear, coherent, and grammatically correct.

• Draft the final report for the PDNA.

Annex 3: Stakeholders involved

TABLE 93: PDNA CONTRIBUTION – AGENCIES

Sector	Leading Agency	Co-Leading Agency	Supporting Agency
Housing	Ministry of Housing & Construction	UN-HABITAT	NHDA, NBRO, NDRSC
Education	Ministry of Education	UNICEF	ADPC
Health	Ministry of Health		
Agriculture	Ministry of Agriculture	WFP, FAO	Ministry of Plantation Industries, Department of Export Agriculture, Ceylon Fishery Harbors Cooperation, Agricultural & Agrarian Insurance Board, Ministry of Rural Economic Affairs, Department of Agriculture
Industry and Commerce	Ministry of Industry and Commerce,	Chamber of Commerce, UNDP and ILO	Insuarence Board of Sri Lanka
Power Supply	Ministry of Power and Renewable Energy		
Irrigation	Department of Irrigation, Depatment of Agrarian Development	World Bank	
Water & Sanitation	National Water Supply and drainage board	World Bank	UNOPS
Transport	Ministry of Highways and Higher Education	World Bank	RDA, Ministry of Transport and Civil Aviation
Gender	Ministry of Women and Child Affairs, DMC	UNFPA, UNDP	OXFAM, UNICEF
Environment	Ministry of Mahaweli Development and Environment	UNDP	Oxfam, ADPC Department of Wildlife Conservation, Forest Department, Centre for Environment Justice
DRR	DMC, NDRSC	ADPC, UNDP	UNICEF, UNOPS, Janathakshan

TABLE 94: DISTRICT BREAKDOWN OF DAMAGES AND LOSSES BY SECTOR

Sector	Galle		Hambantota		Kalutara		Matara		Ratnapura		Non-categorized effects by district		Total	
	Damages	Losses	Damages	Losses	Damages	Losses	Damages	Losses	Damages	Losses	Damages	Losses	Damages	Losses
Housing	6,804.55	462.20	650.22	35.21	6,379.58	409.30	9,785.03	738.39	5,427.63	347.44			29,047.01	1,992.54
WASH	126.07	44.35	195.42	1.80	300.99	65.95	359.50	21.79	479.91	9.61			1,461.89	143.50
Health	33.00		-		23.00		28.93		62.70			201.83	147.63	201.83
Agriculture	3,366.52	414.39	106.73	347.07	3,204.30	398.05	2,581.10	826.59	1,034.30	415.02			10,292.95	2,401.12
Industry	532.58	564.00	161.17	23.00	413.44	466.00	903.72	856.00	609.40	316.00			2,620.31	2,225.00
Irrigation	239.30	0.50	391.70	3.00	150.00	26.60	907.30	59.70	126.40	4.80			1,814.70	94.60
Power	31.55		8.00		-		185.36				249.41	178.15	474.31	178.15
Education											1,205.20	212.60	1,205.20	212.60
Transport											12,844.60	231.60	12,844.60	231.60
DRR												2,262.46	-	2,262.46
Environment												552.12	-	552.12
Total D&L (LKR)	11,133.57	1,485.44	1,513.24	410.08	10,471.31	1,365.90	14,750.94	2,502.47	7,740.34	1,092.87	14,299.21	3,638.76	59,908.60	10,495.52
District Total Effect (LKR)		**12,619.01**		**1,923.32**		**11,837.21**		**17,253.41**		**8,833.21**		**17,937.97**		**70,404.12**
District Total Effect (US$)		**84.13**		**12.82**		**78.91**		**1115.02**		**58.89**		**119.59**		**469.36**

Annex 5: Damages and Losses to the Private and Public Sector

TABLE 95: SECTOR DAMAGES AND LOSSES BREAKDOWN – PRIVET AND PUBIC

Sectors	Private (LKR)	%	Public (LKR)	%	Other	%	Total Effect (LKR)
Social Sector	29,219,610,000.00	60.68	3,587,190,000.00	16.07	-	-	32,806,800,000.00
Housing, Land and Settlements	29,047,010,000.00	60.32	1,992,530,000.00	8.93	-	-	31,039,540,000.00
Health and Nutrition	-	-	349,460,000.00	1.57	-	-	349,460,000.00
Education	172,600,000.00	0.36	1,245,200,000.00	5.58	-	-	1,417,800,000.00
Productive Sector	17,539,602,499.00	36.42	-	-	-	-	17,539,602,499.00
Food Security, Agriculture, Livestock, Fisheries	12,694,070,550.00	26.36	-	-	-	-	12,694,070,550.00
Industry and commerce	4,845,531,949.00	10.06	-	-	-	-	4,845,531,949.00
Infrastructure Sector	127,400,000.00		17,185,478,696.11	76.99	-	-	17,313,338,696.11
Irrigation	-		1,909,300,000.00	8.55	-	-	1,909,300,000.00
Water and Sanitation	-		1,675,378,696.11	7.51	-	-	1,675,378,696.11
Transport	127,400,000.00		12,948,800,000.00	58.01	-	-	13,076,200,000.00
Power supply	-		652,000,000.00	2.92	460,000.00	100.00	652,460,000.00
Cross Cutting Issues	1,266,770,818.05	1.45	1,547,816,876.59	6.93		-	2,814,587,694.64
Environment	-		552,123,493.70	2.47	-	-	552,123,493.70
Disaster Risk Reduction including Urban Risks	1,266,770,818.05	2.63	995,693,382.89	4.46	-	-	2,262,464,200.94
Employment & Livelihood	-		-	-	-	-	-
Gender and Social inclusion	-		-	-	-	-	-
Total (LKR)	48,153,383,317.05	99.74	22,320,485,572.70	100.00	460,000.00	100.00	70,474,328,889.75

TABLE 96: SECTOR DAMAGE AND LOSSES SUMMARY- PRIVATE AND PUBLIC

Sector	%
Private (LKR)	68.33
Public (LKR)	31.67
Other	0.00

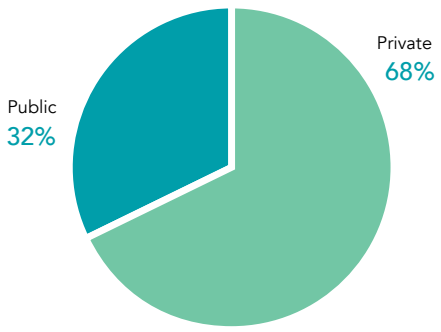

FIGURE 28: COMPARISON PUBLIC PRIVATE EFFECTS

TABLE 97: DISTRICT BREAKDOWN OF RECOVERY NEEDS BY SECTOR

	Galle			Matara			Hambantota		
	Short	Medium	Long	Short	Medium	Long	Short	Medium	Long
Housing	461.60	5,028.96	12,917.37	737.31	7,634.72	19,199.87	35.03	514.06	653.48
Education									
Health	9.00	148.00	29.00	15.00	21.00	4.00			
Agriculture									
Industry									
Irrigation	59.00	240.00		60.00	1,180.00		3.00	509.00	
WASH	1.00	137.58	1,705.72	1.00	394.34	1,120.98		214.96	785.06
Transportation	2,374.45	985.25		4,449.07	1,658.31		371.15	174.28	
Power									
Environment									
DRR									
Gender									
Total (LKR)	2,905.05	6,539.79	14,652.09	5,262.38	10,888.37	20,324.85	409.18	1,412.30	1,438.54
District Total Effect (LKR)			**24,096.93**			**36,475.60**			**3,260.02**
DIstrict Total Effect (US$)			**160.65**			**243.17**			**21.73**

Kaluthara			Rathnapuara			Non categorized Effects by District			Total		
Short	Medium	Long	Short	Medium	Long	Short	Medium	Long	Short	Medium	Long
407.32	4,809.46	9,953.33	346.36	6,288.51	7,100.82	-	15.00	5,189.90	1,987.62	24,290.71	55,014.76
						125.45	1,306.00	84.20	125.45	1,306.00	84.20
21.00	10.00		35.00	126.30	222.00		319.00	2.55	80.00	624.30	257.55
						939.00	1,609.89	1,721.00	939.00	1,609.89	1,721.00
						5.00	19.00	17.00	5.00	19.00	17.00
27.00	195.00		5.00	164.00					154.00	2,288.00	-
1.70	329.22	1,174.49		527.91	1,913.19				3.70	1,604.01	6,699.44
1,326.09	690.40		2,006.09	846.76		173.00	34.60		10,699.85	4,389.60	-
							554.00	1,566.00	-	554.00	1,566.00
						303.00	530.00		303.00	530.00	-
						163.50	443.00	778.00	163.50	443.00	778.00
						33.43	61.50	5.00	33.43	61.50	5.00
1,783.11	6,034.08	11,127.82	2,392.45	7,953.48	9,236.00	1,742.38	4,891.99	9,363.65	14,494.55	37,720.01	66,142.95
		18,945.01			**19,581.93**			**15,998.02**			**118,357.50**
		126.30			**130.55**			**106.65**			**789.05**

Annex 7: International Response- Foreign Donations

TABLE 98: INTERNATIONAL RESPONSE: FOREIGN DONATIONS

Agency Name	Districts	Sectors	Emergency Funds (LKR)**	Own Budget Cost (LKR)*
ACTED	Ratnapura	Early Recovery, WASH	2,668,913	N/A
ADPC		Coordination		
ADRA Sri Lanka	Galle, Matara, Kalutara	Food Security, Shelter and NFI	30,116,400	15,750,000
Alliance Development Trust (ADT)	Galle, Kalutara, Kegalle	Child Protection, Food Security, Health, NFI/ Hygeine, WASH	3,300,000.00	221,158.00
Americares	Kalutara, Ratnapura	Health	762350	3049400
A-PAD	Colombo, Galle, Gampaha, Hambantota, Kalutara, Matara, Ratnapura	Animal Protection, Coordination, Early Recovery, Food Security, Health, Hygiene, Information/Needs Assessment, Search and Rescue, WASH	N/A	34,300,000
CBM/Navajeevana	Hambantota, Matara	Education, Health	N/A	1,760,250
ChildFund Sri Lanka	Galle,	Education, Protection		20,210,000.00
Direct Relief		Health		
Habitat for Humanity Sri Lanka	Galle, Kalutara	Shelter, WASH		
Handicap International	Matara	Shelter and NFI		
HELVETAS	Ratnapura	Early Recovery, WASH		
Humedica International Lanka	Galle, Matara, Ratnapura	Food Security, Shelter and NFI		
ILO	Kalutara, Ratnapura	Early Recovery, Emergency Employment Creation		4600500
International Water Management Institute (IWMI)	Colombo, Galle, Hambantota, Kalutara, Matara, Ratnapura,	Coordination		
IOM	Matara, Ratnapura	Health, Shelter and NFI	300,000,000	0
Islamic Relief – SL	Matara, Ratnapura	Food Security, Hygiene, Shelter and NFI		
Japan Emergency NGO	Ratnapura	Shelter and NFI		
LEADS	Galle, Hambantota, Kalutara, Matara, Ratnapura, Trincomalee	Education, Food Security, Health, Psycho-social Support, Shelter and NFI, WASH		
Muslim Aid	Kalutara, Matara, Ratnapura	Education, Food Security, Livelihoods, Early recovery		442,123.17
Oxfam	Kalutara, Matara, Ratnapura	Protection, WASH, Food Security,		
PARCIC	Matara	Education, Shelter and NFI	33,832,976	1,700,000
Peace Winds Japan	Kalutara	Shelter and NFI		
People in Need	Ratnapura	Early Recovery, WASH		
Plan International Sri Lanka	Matara, Ratnapura	Education, Protection, Shelter and NFI, WASH	99,000,000	89,000,000
Sarvodaya	Colombo, Galle, Gampaha, Kalutara, Matara, Ratnapura	Child Protection, Education, Shelter and NFI, WASH		
Save the Children	Galle, Matara	Child Protection, Education, Shelter and NFI, WASH		

TABLE 98: INTERNATIONAL RESPONSE: FOREIGN DONATIONS

Agency Name	Districts	Sectors	Emergency Funds (LKR)**	Own Budget Cost (LKR)*
Sri Lanka Red Cross	Colombo, Galle, Gampaha, Kalutara, Matara, Ratnapura	Coordination, Food Security, Health, Search and Rescue, Shelter and NFI, WASH		
Team Rubicon UK	Matara, Ratnapura	Coordination, Shelter and NFI, WASH		5352470.93
UNFPA	Galle, Hambantota, Kalutara, Matara, Ratnapura	Health, Protection		32937275.25
UN-Habitat	Galle, Kalutara	Shelter and NFI	103,511,096.70	0
UNICEF	Galle, Gampaha, Kalutara, Matara, Ratnapura	Child Protection, Coordination, Education, Food Security and Nutrition, WASH	253,504,476	13,861,417
UNV	Colombo, Galle, Ratnapura	Coordination, Field Work, Relief		
WFP	Galle, Kalutara, Matara, Ratnapura	Coordination, Food Security	12679562	
WHO	Colombo, Galle, Gampaha, Hambantota, Kalutara, Kegalle, Matara, Ratnapura	Health	204,210,450	0
World Vision Lanka	Galle, Gampaha, Kalutara, Kegalle, Nuwara Eliya, Ratnapura	Assessment, Child Protection, Coordination, Food Security, Health, Search and Rescue, Shelter and NFI, WASH		
Sub Total:			**1,043,586,223.70**	**223,184,594.35**
Overall Total:				**1,266,770,818.05**

UN UN	873,905,585	51,399,192
INGOS	169,680,639	171,785,402
	1,043,586,224	223,184,594

Housing

TABLE 99: DEFINITION OF SECTOR (URBAN, ESTATE AND RURAL)

Urban Sector	All areas administrated by the Municipal and urban councils constitutes 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 laborers.
Rural sector	All areas other than urban and estate comprise the rural sector

TABLE 100: CLASSIFICATION OF HOUSING UNITS

Type of housing units	Type of principal material unit		
	Wall	Roof	Floor
Permanent	Bick/ 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	Bick/ Cabook/ Cement Blocks/ Stone/ Pressed soil blocks	Tile/ Asbestos/ Metal Sheets	Mud
	Bick/ Cabook/ Cement Blocks/ Stone/ Pressed soil blocks	Cajan/ Palmyrah/ Straw/ Metal Sheets	Cement/ Mud/ Wood
	Mud	Tile/ Asbestos/ Metal Sheets	Mud/ Wood
	Mud	Cajan/ Palmyrah/ Straw	Cement/ Mud/ Wood
	Plank/ Metal Sheets	Tile/ Asbestos/ Metal Sheets	Cement/ Mud/ Wood
	Plank/ Metal Sheets	Cajan/ Palmyrah/ Straw	Cement
Improvised	Cadjan/ Palmyrah/ Straw	Any material	Any Material
	Plank/ Metal Sheets	Cajan/ Palmyrah/ Straw	Mud/ Wood/ Sand

TABLE 101: BASELINE DATA, CENSUS OF POPULATION AND HOUSING – 2012

District	No. of households	No. of housing units	Type of unit								No. of rented houses	% of rented houses
			Permanent		Semi-permanent		Improvised		Unclassified			
Kalutara	305737	302371	271953	89.94%	29657	9.81%	760	0.25%	1	0.03%	7937	2.62%
Rathnapura	285893	284282	213540	75.12%	70130	24.67%	601	0.21%	11	0.39%	3230	1.14%
Galle	273140	271236	238153	87.80%	32094	11.83%	920	0.34%	69	0.03%	3332	1.23%
Matara	206790	205153	177754	86.64%	26520	12.93%	787	0.38%	92	0.04%	1794	0.87%
Hambantota	156476	155716	131470	84.43%	23956	15.38%	290	0.19%	0	0.00%	1526	0.98%
Total	1228036	1218758	1032870	84.75%	182357	14.96%	3358	0.28%	173	0.01%	17819	1.46%

TABLE 102: NUMBER OF HOUSES DAMAGED BY DISTRICT

District	# of houses damaged			
	Minor	Partial	Full	Total
Kalutara	3548	10842	602	14992
Ratnapura	3315	9030	803	13148
Galle	9898	8990	445	19333
Matara	10398	17288	1015	28701
Hambantota	688	304	143	1135
Total	27847	46454	3008	77309

TABLE 103: COST OF PARTIAL DAMAGES TO HOUSES

District	Partial Damage (LKR Million)														
	< 500 sq.ft						500-1000 sq.ft.						>1000 sq.ft.		Total Cost
	Imp	Cost	semi	Cost	per	Cost	Imp	Cost	semi	Cost	per	Cost	per	Cost	
Kalutara	901	20.39	2496	136.03	0	0.00	1082	51.40	2121	522.96	5514	1916.12	2276	1048.38	3695.27
Ratnapura	599	13.55	3119	169.99	0	0.00	648	30.78	2517	620.60	3902	1355.95	1530	704.76	2895.62
Galle	2588	58.55	1977	107.75	0	0.00	2964	140.79	3116	768.29	6445	2239.64	1798	828.20	4143.22
Matara	4649	105.18	4194	228.57	0	0.00	4132	196.27	3882	957.16	7807	2712.93	3022	1392.01	5592.12
Hambantota	27	0.61	86	4.69	0	0.00	25	1.19	78	19.23	513	178.27	263	121.14	325.13
Total	8764	198.29	11872	647.02	0	0.00	8851	420.42	11714	2888.23	24181	8402.90	8889	4094.50	16651.36

TABLE 104: COST OF FULL DAMAGES TO HOUSES

District	Fully Damaged (LKR Million)														
	below 500						500-1000						>1000		Total cost
	Imp	Cost	semi	Cost	per	Cost	Imp	Cost	semi	Cost	per	Cost	per	Cost	
Kalutara	25	4.53	60	26.16		0.00	10	3.80	75	147.94	345	959.10	87	320.595	1462.12
Ratnapura	123	22.26	256	111.62	0	0.00	39	14.82	139	274.18	197	547.66	49	180.565	1151.10
Galle	80	14.48	104	45.34	0	0.00	25	9.50	36	71.01	134	372.52	66	243.21	756.06
Matara	264	47.78	153	66.71	0	0.00	91	34.58	119	234.73	299	831.22	89	327.965	1542.98
Hambantota	22	3.98	70	30.52	0	0.00	8	3.04	10	19.73	24	66.72	9	33.165	157.15
Total	514	93.03	643	280.35	0	0.00	173	65.74	379	747.58	999	2777.22	300	1105.5	5069.42

TABLE 105: DAMAGE TO HOUSEHOLD EFFECTS

Damage to Household Effects (LKR Million)													
District	Improvised				Semi-permanent				Permanent				Total Cost
	<500	Cost	500-1000	Cost	<500	Cost	500-1000	Cost	500-1000	Cost	>1000	Cost	
Kalutara	926	6.95	1092	24.57	2556	95.85	2196	142.74	5859	952.09	2363	590.75	1222.19
Ratnapura	722	5.42	687	15.46	3375	126.56	2656	172.64	4099	666.09	1579	394.75	1380.91
Galle	2668	20.01	2989	67.25	2081	78.04	3152	204.88	6579	1069.09	1864	466.00	1905.27
Matara	4913	36.85	4223	95.02	4347	163.01	4001	260.07	8106	1317.23	3111	777.75	2649.92
Hambantota	49	0.37	33	0.74	156	5.85	88	5.72	537	87.26	272	68.00	167.94
	9278	69.59	9024	203.04	12515	469.31	12093	786.05	25180	4091.75	9189	2297.25	7326.23

Summary of damages	
Type of damage	Cost (LKR.Million)
Partial damage	16651.36
Fully damaged	5069.42
Housing damage	21720.78
household effects	7326.23
Total damages	**29,047.01**

TABLE 106: TOTAL LOSSES IN HOUSING

District		Kalutara	Ratnapura	Galle	Matara	Hambantota	Total
Estimated # of rented houses		16	9	5	9	1	40
Rental loss		1.92	1.08	0.6	1.08	0.12	4.8
# of tents		380	220	32	640	200	1472
Cost of tents		22.8	13.2	1.92	38.4	12	88.32
Transitional shelters		120	161	89	203	28	601
Cost		18.06	24.09	13.35	30.45	4.26	90.21
Emergency shelter repairs		7195	6173	9444	13843	152	36807
Cost		107.93	92.6	141.66	207.65	2.28	552.11
Debris clearence	# partially damaged	14390	12345	18888	27686	992	74301
	Cost	71.95	61.73	94.44	138.43	4.96	371.51
	# fully damaged	567	753	444	1001	143	2908
	Cost	8.51	11.3	6.66	15.015	2.15	43.62
Emergency allowance	# of households	14987	8479	19333	29262	830	72891
	Cost	149.87	84.79	193.33	292.62	8.3	728.91
Rent allowance	# of households	883	1954	455	602	24	3918
	Cost	19.87	43.97	10.24	13.55	0.54	88.16
Camp care and maintenance	# of families in camps	112	196	0	16	8	332
	Cost	8.4	14.7	0	1.2	0.6	24.9
Total cost		**409.3**	**347.44**	**462.2**	**738.39**	**35.21**	**1992.53**

TABLE 107: TOTAL RECOVERY NEEDS FOR HOUSING

Early recovery needs (LKR Million)																	
District	Type of Assistance																Total cost
	# of tents (NDRSC)	Cost of tents	Transitional shelters	Cost	Emergency shelter repairs	Cost	Debris clearence				Emergency allowance (NDRSC)		Rent allowance (NDRSC)		Camp care and maintenance		
							# partially damaged	Cost	# fully damaged	Cost	# of households	Cost	# of households	Cost	# of camps	Cost	
Kalutara	380	22.8	120	18	7195	107.93	14390	71.95	567	8.51	14987	149.87	883	19.87	112	8.40	407.32
Ratnapura	220	13.2	161	24.09	6173	92.60	12345	61.73	753	11.30	8479	84.79	1954	43.97	196	14.70	346.36
Galle	32	1.92	89	13.35	9444	141.66	18888	94.44	444	6.66	19333	193.33	455	10.24	0	0	461.60
Matara	640	38.4	203	30.45	13843	207.65	27686	138.43	1001	15.015	29262	292.62	602	13.55	16	1.20	737.31
Hambantota	200	12	28	4.2	152	2.28	992	4.96	143	2.15	830	8.3	24	0.54	8	0.60	35.03
Total	1472	88.32	601	90.09	36807	552.11	74301	371.51	2908	43.62	72891	728.91	3918	88.16	332	24.90	1987.61

TABLE 108: MEDIUM-TERM RECOVERY NEEDS

Medium Term (LKR Million)- proposed reconstruction strategy										
District	Flood				Landslide					
	# of partially damaged houses	Cost of repairs for partial damage	# of fully damaged houses	Cost of reconstruction of fully damaged houses	# of landslide affected and high-risk houses	Cost of reconstruction of houses	Total construction cost	Land grant for relocation	Land preparation cost	Technical support and monitoring (6% of construction cost)
Kalutara	14390	2878.00	567	453.60	504	604.80	3936.40	201.60	60.48	236.18
Ratnapura	12345	2469.00	753	602.40	1509	1810.80	4882.20	603.60	181.08	292.93
Galle	18888	3777.60	444	355.20	92	110.40	4243.20	36.80	11.04	254.59
Matara	27686	5537.20	1001	800.80	111	133.20	6471.20	44.40	13.32	388.27
Hambantota	992	198.40	143	114.40	86	103.20	416.00	34.40	10.32	24.96
Total	74301	14860.20	2908	2326.40	2302	2762.40	19949.00	920.80	276.24	1196.94

TABLE 109: TOTAL RECONSTRUCTION COST

Activity	LKR Million
Improvements to housing assessment and data collection system	15.00
Total Housing construction cost	19949.00
Land grant	920.80
Land preparation cost	276.24
Technical support costs	1196.94
Replacement cost of household assets	1932.73
Total Reconstruction cost	**24290.71**

TABLE 110: DISTRICT-WISE DAMAGES

District	Fully Damaged (LKR Million)														
	below 500						500-1000						>1000		Total cost
	Imp	Cost	semi	Cost	per	Cost	Imp	Cost	semi	Cost	per	Cost	per	Cost	
Kalutara	25	20.00	60	48.00		0	10	8.00	75	229.35	345	1055.01	87	352.6545	1713.01
Ratnapura	123	98.40	256	204.80	0	0	39	31.20	139	425.06	197	602.43	49	198.6215	1560.51
Galle	80	64.00	104	83.20	0	0	25	20.00	36	110.09	134	409.77	66	267.531	954.59
Matara	264	211.20	153	122.40	0	0	91	72.80	119	363.90	299	914.34	89	360.7615	2045.41
Hambantota	22	17.60	70	56.00	0	0	8	6.40	10	30.58	24	73.39	9	36.4815	220.45
Total	514	411.20	643	514.40	0	0	173	138.40	379	1158.98	999	3054.94	300	1216.05	6493.97

TABLE 111: RECONSTRUCTION NEEDS

Reconstruction Needs – Actual Cost Estimate (LKR Million)															
District	Minor Damage (LKR Million)														
	<500 sq.ft.						500-1000 sq.ft.						>1000 sq.ft.		Total cost
	Imp	Cost	semi	Cost	per	Cost	imp	Cost	semi	Cost	per	Cost	per	Cost	
Kalutara	901	720.80	2496	1523.56	0	0	1082	865.60	2121	2091.84	5514	3832.23	2276	2096.77	11130.79
Ratnapura	599	479.20	3119	1903.84	0	0	648	518.40	2517	2482.39	3902	2711.89	1530	1409.51	9505.23
Galle	2588	2070.40	1977	1206.76	0	0	2964	2371.20	3116	3073.16	6445	4479.28	1798	1656.41	14857.20
Matara	4649	3719.20	4194	2560.02	0	0	4132	3305.60	3882	3828.62	7807	5425.87	3022	2784.02	21623.32
Hambantota	27	21.60	86	52.49	0	0	25	20.00	78	76.93	513	356.54	263	242.29	769.85
Total	8764	7011.20	11872	7246.67	0	0	8851	7080.80	11714	11552.93	24181	16805.80	8889	8188.99	57886.39

TABLE 112: RESETTLEMENT COST FOR LANDSLIDE AFFECTED HOUSEHOLDS

District	No. of relocation plots	Cost of land	Land preparation cost 30%
Kalutara	504	201.6	60.48
Ratnapura	1509	603.6	181.08
Galle	92	36.8	11.04
Matara	111	44.4	13.32
Hambantota	86	34.4	10.32
Total	2302	920.8	276.24

TABLE 113: ACTUAL RECONSTRUCTION COSTS

Actual Recontruction Costs (Medium Term)	
Activity	Cost (LKR.Million)
Minor damage (Flood affected)	57886.39
Fully damaged (Flood affected)	6493.97
Construction cost (flood damaged)	**64380.36**
Land grant (Landslide affected)	920.80
Land prepration cost (landslide affected)	276.24
Construction of 1861 housing units from high risk locations (not damaged in the disaster) (landslide affected)	2233.2
Construction cost (Landslide affected)	**3430.24**
Total construction cost	**67810.60**
Technical support cost 6% of total construction cost	**4068.64**
household effects	**7326.23**
Total Housing reconstruction needs	**79205.47**

TABLE 114: HOUSING RECOVERY NEEDS

Distribution of Housing Recovery needs by timeline	
Total medium-term housing reconstruction needs	24290.71
Long term housing reconstruction needs	54914.76
Early recovery needs	1987.61
	81193.08

TABLE 115: LONG-TERM RECOVERY NEEDS

Long term Needs (LKR Millions)	
Activity	Cost (LKR Mn)
Multi-hazard risk mapping for Western, Central, Uva, Sabaragamuwa and Southern Provinces	50
Development of physical and land use plans incorporating hazard maps and Climate Change adaptation measures	20
Improving regulatory system for enforcement of building regulations as per the physical and land-use plans	10
Mainstreaming DRR and Climate change adaptation measures into the construction industry	20
Long term housing reconstruction needs	54,914.76
Total	**55014.76**

TABLE 116: VALUE OF HOUSING

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 sylinder	2,500	gas cooker	4,000
others	2,250	TV	20,000	gas cooker	4,000	gas cooker	4,000	iron	1,500	gas sylinder	2,500
TOTAL	15,000	kitchen table	2,000	gas sylinder	2,500	gas sylinder	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

TABLE 117: GRADE ONE NEW ADMISSIONS BY GENDER & WITH ECCE – 2015

Grade One New Admissions by Gender & with ECCE – 2015							
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
	Nuwaraeliya	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
	Mullativu	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
	Puttlam	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	Anuradapura	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 118: GOVERNMENT SCHOOLS BY FUNCTIONAL GRADE- 2015

Province	District	1AB	1C	Type 2	Type 3	Total
	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
	Nuwaraeliya	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
	Mullativu	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
	Puttlam	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 119: GOVERNMENT SCHOOLS BY FUNCTIONAL GRADE – 2015

Province	District	1AB	1C	Type 2	Type 3	Total
	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
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	Total	**115**	**317**	**467**	**620**	**1,519**
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Uva	Badulla	45	133	195	225	598
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	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 120: DISTRICT SCHOOLS USED AS TEMPORARY SHELTERS

District	Number of schools being used as temporary shelters
Kalutara	11
Galle	2
Matara	7
Rathnapura	26
Hambantota	3
Total	**49**

TABLE 121: NUMBER OF AFFECTED CENTRES

District	Number of Affected Centres				
	Technical colleges	Vocational Training Authority Centre	National Youth Corp Centres	Nat: You: Services Council Centres	Recovery Cost (LKR. Mn)
Kalutara	0	0	1	0	0.02
Galle	0	1	2	0	16.51
Matara	1	1	1	1	7.88
Hambantota	0	1	0	0	0.07
Ratnapura	0	0	1	0	0.1
Total	1	3	5	1	24.58

TABLE 122: DETAILED BUDGET

	Sub. Total	Activity Total
Resumption of education services		-
Provision of uniform, textbooks and teaching-learning materials:		
12500 school students at the rtae of LKR.1200 per child (uniform: LKR. 800/- and LKR. 400 for text books and stationery).		15,000,000
Provistion for lost furniture		
336 schools × 50 units (tables and chairs) at LKR. 3000 per unit		50,400,000
Repairs to damged pre-schools and replacement of lost furniture and learning materials		
The cost of repairs to 382 damaged pre-schools and replacement of lost furniture and learning materials were calculated at the rate of LKR. 88,875 for each pre-school.		33,950,250
Devise a mechanism to closely follow up on school dropout		
Cost of a local consultant to work with NFE unit of MOE to devlop necessary tools and capacity buiding.		
LKR. 400,000 per month for 12 months	4,800,000	
2 workshops at the rate of 100,000/- each	200,000	5,000,000
Provision for lost equipment		
The cost of equipment belong to science labs, home science units, aesthetic rooms, sports unit and audio video units have been calculated at the rate of LKR.2 million for fully dmaged units and LKR.1.5 million for partly damaged units except for fully dmaged computer unit at LKR. 2.5 million.		
Computer Lab: 11FD × 3.1 million and 24 PD X 1.9 million	79,700,000	
Science lab: 15FD × 2.5 million and 6PD × 1.9 million	48,900,000	
Home Science Lab: 6FD × 2 million and 8PD × 1.5 million	30,200,000	
Aesthetic Room: 12FD × 2million and 9PD × 1.5 million	47,100,000	
Sports units: 6FD × 2 million and 6 PD × 1.5 million.	24,000,000	
Audio Video units: 3FD × 2 million and 7PD × 1.5 million	20,800,000	
Agricultural Unit 8 × 1 million	8,000,000	258,700,000
Reconstruction of partially damaged school buildings		
336 partially damaged schools have been calculated at the rate of LKR. 1.07 million per school.		361,536,000
Construction of schools recommended for relocation and fully damaged schools.		
Cost of reconstruction of 66 new school buidings has been calculated at the rate of LKR. 10 milion per school.		660,000,000
Repaires to technical, vocational and youth service centres		
Reapirs to 1 damaged Technical College, 3 Vocational Training Authority Centres, 5 National Youth Co-operative Centres and 1 National Youth Services Council Centres. The damage was estimated on the basis of information provided by the Ministry of skills development and vocational training. No breakdown was given.		24,580,000

TABLE 122: DETAILED BUDGET

Continuation

	Sub. Total	Activity Total
Provide psychosocial support to affected students and families.		
Training of 5 persons from each 336 pre-schools and 382 schools		
Training of teachers and committee members (400 training sessions) at LKR. 35,000 per session	14,000,000	
Implemenation support to affected pre-schools and schools at LKR.10,500 per schhol.	7,539,000	
Implemenation support to affected pre-schools and schools at LKR.2000 per schho0l in medium term	1,436,000	
Implemenation support to affected pre-schools and schools at LKR.2000 per schhool in long term	1,436,000	24,411,000
Review of existing curriculum and textbooks with DRR and resilience perspective.		
1 consultant for 6 months at LKR. 400,000 per month.		2,400,000
Promote DRR related outdoor action orieted project work for primary, secondary and A/L students		
Develop Teacher Guide: 4 workshops at LKR. 55,000 per workshop	220,000	
Printing of 25000 Teacher Guides at LKR. 250 per copy	6,250,000	
Development of story books: 10 workshops at LKR. 50,000 per workshop	500,000	
Printing of 10,000 copies of story books at LKR. 250 per copy	2,500,000	
Printing of 8000 posters at LKR. 15 each	120,000	9,590,000
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. 50,000 per workshop		8,600,000
Improving existing policies, guidelines and systems for better safety and DRR preparedness in schools.		
An International consultancy will be saught for 45 days at the rate of US$ 300 a day (US$ 13,500)	1,957,500	
Perdiem: US$ 3500	507,500	
Transport: US$ 1500	217,500	
Total: US$ 18500		2,682,500
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. 5,500 per school	55,885,500	
Development of a software	1,500,000	
		57,385,500
Develop an emegency response mechnism at MOE along with a national data base to track damages and loss in a case of an emeregency		
Development of data collection tools, 3 workshops at LKR. 50,000 per day	150,000	
Develop of a guidebook on emegency response in education, printing and dissemination: 5 workshops at LKR. 45,000 each and printing of 1000 copies at LKR. 200 each.	525,000	
Capacity buiding workshops for emeregency focal points: 4 workshops at LKR. 50,000 per workshop	200,000	
Provision of hardware: 9 copmputers and printers at LKR. 175,000 per unit	1,575,000	2,450,000
Total		**1,516,685,250**

TABLE 123: DAMAGE TO INFRASTRUCTURE

Disaster effects	Assumption		LKR million		
	Comments		Public	Private	Total
Damages to infrastructure and assets					
Costs of fully damaged schools	62 school buildings have been fully damaged	The cost of damage is calculated at LKR. 10 million per fully damaged school.	620	0	620
Costs of partly damaged schools	248 schools have been partly damged to the floors, roof, wallls, fencing and water and sanitation facilities	The damage is calculated on the basis of information gathered from information provided by schools and pre-schools	171.50	76.4	247.9
Costs of damage to school furniture	Furniture used by students, teachers and officers has been damaged in all 336 effected schools.	The damage is calculated on the basis of information gathered from information provided by schools and pre-schools.	40.32	57.3	97.6
Cost of damage to equipment	Equipment belong to computer lab, science lab, home science unit, aesthetic room, sports unit and audio video units have been damaged as water levels went up in the schools	The damage is calculated on the basis of information gathered from information provided by schools			
Computer lab			63.5		63.5
Science Lab			39		39
Home Science Unit			24		24
Aesthetic Room			37.5		37.5
Sports			21		21
Audio video			16.5		16.5
Costs of damage to pre-schools	Damages to 382 pre-schools, furniture and learning materials	The damage is calculated at the rate of LKR. 20,000 per damaged pre-school building, LKR. 15,000 for furniture, LKR.750 per uniform set and LKR. 600 for books and stationary per child for 7640 students	0	23.6	23.6
Cost of damage to technical, Vocational and Youth Centres	Damages to 3 Technical Colleges, 3 Vocational Training Authority Centres, 5 National Youth Co-operative Centres and 1 National Youth Services Council Centres	Calculated on the basis of information provided by the Ministry of skills development and vocational training (NPD report)	14.6		14.6
Loss due to disruption in service delivery / Production of goods and services:					
Cost of cleaning up/ debris removal	All 336 effected schools had to clean up the schools' environment removing the debris, mud and silts collected at the school premises	Cost of debris removal is calculated at the rate of LKR. 60,000 per affected school.	20	5	25
Cost of repairs to schools being used as IDP camps	49 schools were used as IDP camps during the first two weeks of the flooding and hence needed minor repairs to make it ready to beging normal school activities.	The costs of repairs were calculated at LKR. 1.2 million per schools used as IDP camps.	58.8	0	58.8
Cost of erecting Temporary Learning Centers at schools	3 no of temporary learning centres were erected in 3 schools in Ratnepura district	The costs of erecting a TLC has been calculated at LKR.1.5 million. per building.	4.5	0	4.5

TABLE 123: DAMAGE TO INFRASTRUCTURE

Continuation

Disaster effects	Assumption		LKR million		
	Comments		Public	Private	Total
Cost of unifrom, text books and stationary and other materils delived to affected students.	Ministry of Education took immediate measures to replace lost uniform, text books and stationery for students in effected schools	74000 school students at the rtae of LKR.1200 per child (uniform: LKR. 800/- and LKR. 400 for text books and stationery).	88.8	10.3	99.1
Loss due to disruption in education governance.					
Cost of additional manpower deployed			0	0	0
Loss due to Increasing risk and vulnerability					
Cost connected to prevention of water borne diseases such as dengue and diarrrohea through cleaning the schools environment	Cleaning drainage system, schools' grounds and repairs to WASH facilities	The cost of cleaning the drainage system is calculated at LKR.7500 per affected school.	25.2	0	25.2
TOTAL			**1245.2**	**172.6**	**1417.8**

TABLE 124: AFFECTED SCHOOLS BY FUNCTIONAL GRADE AND EDUCATIONAL ZONE

SOURCE: MINISTRY OF EDUCATION

District	Educational Zones	AB1	C1	Type 2	Type 3
Galle District	Galle	0	1	0	1
	Udugama	0	6	2	3
	Elpitiya	2	0	1	1
Total		2	7	3	5
Matara District	Matara	3	5	5	2
	Akuressa	5	8	10	6
	Deniyaya	1	5	10	6
	Mulatiyana	5	2	16	5
Total		14	20	41	19
Hambantota District	Tangalle	2	1	4	0
	Walasmulla	2	2	3	3
	Hambantota	2	0	1	0
Total		6	3	8	3
Kaluthara	Kaluthara				
	Horana				
	Mathugama				
	Total	13	24	62	30
Rathnapura	Rathnapura				
	Niwithigala				
	Balangoda				
	Embilipitiya				
	Total				76

TABLE 125: NUMBER OF AFFECTED PRESCHOOLS

District	Number of Affected Preschools	
	Number of preschools	Recovery Cost (LKR.Mn)
Kalutara		
Galle	59	4.9
Matara	118	11
Hmabantota	2	0.1
Ratnapura	113	13.45
Total	**382**	**33.95**

TABLE 126: NUMBER OF AFFECTED SCHOOLS

District	Total Number of Affected Schools	Structural Damages							Supply and Materials							Equipment														Increasing Risk
		Roof	Wall	Floor	Building	Play Ground	Retention Wall	Other (Gate, Doors)	Books	Furniture	Other stationary	Water Supply	Drainage	Electricity	Toilet Unit	Computer Lab		Science Lab		Home Science Lab		Aesthetic Room		Sports		Audio Video		Agricultural equipment	
																Fully Damage	Partially Damage	Fully Damage	Partially Damage	Fully Damage	Partially Damage	Fully Damage	Partially Damage	Fully Damage	Partially Damage	Fully Damage	Partially Damage		
Kaluthara	136	64	5	2	17	1	17	2				4	1	3	6	1										1			5
Rathnapura	94	14	5		18	1	11		9	8		5		1	1	4	7	8	1	3	3	4	2	2	1				26
Hambantota	18	20	6	1	2		2	2	3	3	2		1	1	3		2	1	1									1	5
Galle	17	5	1	1	6	1	5		1	5		1	1	1	1	4		2	2	1		2		1					
Matara	71	41	10	2	21	9	15	5	12	16	10	13	4	5	15	2	15	4	2	2	5	6	7	3	5	2	7	4	25

Description of damage and suggested actions by health institution

TABLE 127: AFFECTED HEALTH INSTITUTIONS IN RATHNAPURA DISTRICT (AYAGAMA AND BALANGODA)

MOH Area	Name of the affected Institution	Damage Occurred 1)Building Structurar 2)Equipment Furniture	Type of Damage 1)Fully 2)Partually	Suggested ActAion	Approximate Value (LKR mn)
Ayagama	DH- Ayagama	Hospital relocated due to landslide risk.	No structural damage.	Relocation to a new venue.	300M
		Access roads blocked due to landslides.	Eminent risk of landslides to hospital building & staff quarters.	a). Spot lampe-02	
		Relocated to "Pradeshiya Saba" building	NBRO Report pending.	b). Pulse oximeter-01	
		I.No sanitation facilities to Patients & staff		c). Defibrilator-01	
		II.Mortuary furniture at library building		d). Infusion pump-02	
		III.Drug stores. Dressing room operational and inward in the same building.		e). Infant resuscitation table-01	
		IV.No proper way to dispose clinical and solid waste.		Decision on relocation of hospital to be taken when NBRO report available.	
Balangoda	DH-Rassagala	1.Relocated to Ayurvedic hospital building due to landslide risk at the current location.		*NBRO report on landslide risk pending.	50M
		2.Landslide in the adjoin area previous history of landslide in the adjoining area.		*New location for relocation has been identified.	
		3.A water channel running through hospital premises. 4. Thought to increase risk of landslide in the area. 5. Walls in the ETU, admin and building OPD are cracked. 6. New cracks appeared recently in the OPD building are extending. 7. Relocated venue has limited space(upstairs) 8. Dressings are being done at the kitchen of the ayurvedic hospital OPD. Dental surgery, Drug stores at the same building. 9.No Patient waiting area.		A land adjoining the Ayurvedic hospital building which belongs to estate.	

TABLE 128: AFFECTED HEALTH INSTITUTIONS IN RATHNAPURA DISTRICT (PALMADULLA,NIVITHIGALA,KURUWITA,KALAWANA AND KIRIELLA)

MOH Area	Name of the affected Institution	Damage Occurred 1)Building Structurar 2)Equipment Furniture	Type of Damage 1)Fully 2)Partually	Suggested ActAion	Approximate Value (LKR mn)
Palmadulla	MCH Clinic-Palmadulla	Temporary closed due to landslide risk. Very old building. Structurally unstable. Eminent landslide risk in the No equipment damage.		Needs relocation	2M
	MCH Clinic-Hakamuwa	Inundated	All records destroyed. Possible damage to baby scales delivary sets. BP Apparatus & furniture	Need resupply of equipment	2M
	MCH Clinic-Narangoda	Inundated			4M
Nivitigala	MCH Clinic-Watapotha		All records destroyed. Possible damage to baby scales delivary sets. BP Apparatus & furniture	Need resupply of equipment	2M
	PHM Office-Kiribathgala		All records destroyed. Possible damage to baby scales delivary sets. BP Apparatus &furniture	Need resupply of equipment	0.1M
	PHC-Kolombagama			Need resupply of equipment	0.1M
	PHC-Pathakada		Damage to the building		1M
Kuruvita	PHM Office-Pohorabawa	Inundated	Possible equipment damage Still not accessible (04/07/2017)	Need resupply of equipment	0.1M
	PHM Office-Millavitiya	Inundated	Possible equipment damage Still not accessible (04/07/2017)		0.1M
Kalawana	Weddagala-North	Inundated	Possible equipment damage Still not accessible (04/07/2017)		0.1M
	Hagalagamuwa	Inundated	Possible equipment damage Still not accessible (04/07/2017)		0.1M
	Kukulegama		Damage to the building	Need resupply of equipment	1M
	DH B Pothupitiya	Damages to part of the hospital building and DMO quarters			5M
Kiriella	MCH Clinic-Ellawala	Inundated	Possible equipment damage Still not accessible (04/07/2017)		2M
	PHM Office-Pahalagama	Inundated	Possible equipment damage Still not accessible (04/07/2017)		1M
	PHC-Welipoth		Damage to the building and furniture		0.5M

TABLE 129: AFFECTED HEALTH INSTITUTIONS IN RATHNAPURA DISTRICT (RATHNAPURA PS,RATHNAPURA MC,ELAPATHA AND EHELIYAGODA)

MOH Area	Name of the affected Institution	Damage Occurred 1)Building Structurar 2)Equipment Furniture	Type of Damage 1)Fully 2)Partually	Suggested ActAion	Approximate Value(LKR mn)
Ratnapura PS	MCH Clinic-Kahangama		Damage to the building and furniture		3M
	PMCU-Pulungupitiya		Damage to the building and furniture		1M
	PHC-Ketalianpalla		Damage to the building and furniture	Need to re establish	3M
	PHC-Gurubevilagama		Damage to the building and furniture		1M
	PHC-Palendagama		Damage to the building and furniture	Need to re establish	2M
Ratnapura MC	PHC-Ganegoda		Damage to the building and furniture		1M
	PHC-Mihindugama		Damage to the building and furniture		1M
Elapatha	MCH Clinic & PHM Office-Rajasisugama	Inundated	Possible equipment damage Still not accessible (04/07/2017)		3M
	MCH Clinic & PHM Office-Rajasisugama	Inundated	Possible equipment damage Still not accessible (04/07/2017	Need resupply of equipment	0.4M
Eheliyagoda	PHC-Hewayinna		Damage to the building and furniture		0.1M
	DHC-Wevila		Damage to the building and furniture		0.1M
	DHC-Mitipola		Damage to the building and furniture		0.6M
	DHC-Paligala		Damage to the building and furniture		0.4
	DHC-Mahiyangoda		Damage to the building and furniture		0.1M
	DHC-Hiridurangala		Damage to the building and furniture		0.5M

TABLE 130: DAMAGES IN HEALTH INSTITUTIONS IN KALUTARA DISTRICT

MOH Area	Name of the affected Institution	Damage Occurred 1)Building/ Structural 2)Equipment /Furniture	Type of Damage 1)Fully 2)Partually	Suggested ActAion	Approximate Value(LKR mn)
Madurawala	DH-Galapatha(Type B) HLC Clinic	1)Building/Structural	Partially	Renovation	1M
	Madurawala MCH Clinic	2)Equipment/Furniture	Fully	Replacement	1M
Palindanuwara	Kapugedara MCH Clinic	1)Building/ Structural 2)Equipment /Furniture	Partially Fully	Renovation Replacement	3M 1M
	Palanda MCH Clinic	1)Building/ Structural 2)Equipment /Furniture	Partially Fully	Renovation Replacement	3M 1M
	Iluppotha MCH Clinic	1)Building/ Structural 2)Equipment /Furniture	Partially Fully	Renovation Replacement	3M 1M
	Morapitiya MCH Clinic	1)Building/ Structural 2)Equipment /Furniture	Partially Fully	Renovation Replacement	1M 1M
Bulathsinhala	Naragala MCH Clinic	1)Building/ Structural 2)Equipment /Furniture	Partially Fully	Renovation Replacement	1M 1M
	Veyangalla MCH Clinic	1)Building/ Structural 2)Equipment /Furniture	Partially Fully	Renovation Replacement	3M 1M
	Paragoda MCH Clinic	1)Building/ Structural 2)Equipment /Furniture	Partially Fully	Renovation Replacement	3M 1M
	Ihalawelgama MCH Clinic	1)Building/ Structural 2)Equipment /Furniture	Partially Fully	Renovation Replacement	3M 1M
	Diyakaduwa MCH Clinic	1)Equipment /Furniture	Fully	Replacement	0.5M
	Molkawa MCH Clinic	1)Equipment /Furniture	Fully	Replacement	0.5M

TABLE 131: DAMAGES IN HEALTH INSTITUTIONS IN GALLE DISTRICT

MOH area	Name of the affected institution	Damage occurred 1)Building structure 2)Equipment/Furniture	Type of Damage 1)Fully 2)Partially	Suggested Action	Approximate Value(LKR mn)
Neluwa	PMCU Lankagama	Walls are cracked. Eminent landslide risk in the vicinity	Partially	Decision to relocate to be taken after NBRO report	10M
	MCH clinic Lankagama	Eminent flooding risk, River route changed due to recent floods causing more risk. All the access roads. No possible evacuation route in the case of landslides. If landslides occur only reachable by air. Access road shows erosion due to rerouting of the river. NBRO report regarding landslide risk is pending.	Partially	Decision to relocate to be taken after NBRO report	5M
	MCH clinic Happitiya	Inundated by flood. Damaged to office documents, equipment and furniture (all records destroyed) Secca scale-01, beam weighing scale-02BP Apparatus-02, All furniture (2 tables, 2 steel cup-board, 10 chairs) destroyed. Stock of "Threeposha" destroyed. Landslide risk in the vicinity. NBRO report regarding landslide risk is pending.	Partially	Paiting of walls, Provision of equipment and furniture	2M
	DH Neluwa	No generator Old ambulance		Need a generator Need a new double ambulance	4M 8M
	MOH office	Old vehicle	Partially	Renovation and repair. Supply of furniture and equipment.	6M
Thawalama	DH B Hiniduma	3 wards, labor room, PCU, OPD Inundated (list of equipment damaged attached) Drug stores inundated up to 5ft. Drug stocks destroyed (very few salvaged). Significant medical & non-medical equipment damaged beyond repair. (list attached). Possible landslide risk to three medical wards. MO quarters-01 inundated & damaged. Ambulance caught up in the floods	Partially	Supply of furniture and equipment. Needs new ambulance	6M 8M
	PHM office Hiniduma	Inundated by flood. Damaged to office documents, equipment and furniture	Partially	Painting of walls, Provision of equipment and furniture	1M
	MOH office	Old vehicle		Needs a new double cab	9M
	DH Opatha	No generator		Needs a generator	4M

TABLE 131: DAMAGES IN HEALTH INSTITUTIONS IN GALLE DISTRICT (CONT.)

MOH area	Name of the affected institution	Damage occurred 1)Building structure 2)Equipment/Furniture	Type of Damage 1)Fully 2)Partially	Suggested Action	Approximate Value(LKR mn)
Yakkalamulla	PMCU Yakkalamulla	NBRO report regarding landslide risk is pending		Decision to relocate to be taken after NBRO report	10M
	MCH clinic Udumalagala	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	1M
	MOH Yakkalamulla	Old vehicle		New double cab	9M
Elpitiya	PMCU Kahaduwa	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	2M
	MCH Kahaduwa	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	1M
	MOH Office	Old vehicle	Partially	Needs a double cab	9M
Weliwitiya Divithura	MCH clinic Weliwitiya North	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	1M
	PHI office Ethkandura	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	1M
	MCH clinic & PHM quarters, Akuretiya	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	2M
	MOH clinic WaduWelivitiya (south)	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	1M
	MOH office	Old cab		Needs a double cab	9M
Udugama	DH Nagoda	Inundated by floods, Damaged roof, toilet pits No electricity Old ambulance	Partially	Repairs and painting Need a generator Need a new ambulance	2M 4M 8M
	MCH clinic & PHM quarters Mapalagama	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	2M
	MCH clinic Gonalagoda	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	1M
	MCH clinic & PHM quarters Udalamaththa	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	2M
	MCH clinic Yatalamaththa (East)	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	1M
	MCH clinic & PHM quarters Unanvitiya	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	2M
	MCH clinic Udugama north	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	1M
Udugama	MCH clinic Paranathanayamgoda	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	1M
	PHI office Nagoda	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	1M
	PHI office Mapalagama	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	1M
	PHM office Thalagaswala	Inundated by floods	Partially	Painting of walls, provision of equipment and furniture	1M
	MOH office	Old vehicle		Needs a double cab	9M
Baddegama	MOH office	Old vehicle		Needs a double cab	9M
Imaduwa	MOH office	Old vehicle		Needs a double cab	9M

*All the 12 MOH office of the Galle District does not have generators. To supply generators 15M

TABLE 132: DAMAGES IN HEALTH INSTITUTIONS IN MATARA DISTRICT

MOH area	Name of the affected institution	Damage occurred 1)Building structure 2)Equipment/Furniture	Type of Damage 1)Fully 2)Partially	Suggested Action	Approximate Value(LKR mn)
Deniyaya	BH Deniyaya	Earth slip in between OPD building and Administrative building	No structural, risk of damage to both buildings if landslide persists.	Building aretention wall to prevent further earth slips	3.5M
Kamburupitiya	BH Kamburupitiya	Well and sump inundated. Access road inundated during the floods. Interruption of current supply	Sump damaged	Completion of the construction work of the new wall. Building alternative access road to the hospital.	0.15M 13M
Morawaka	DH Morawaka	Access road to ward no. 01 was inundated. Damage to the roof of the ward no. 01. Toilet pits damaged due to floods.	Damage (complete) to the roof and toilet pits	Reconstruction of the access road. Repair of the ward 01. Renovations of the toilet and pits. Purchase new water pump. Building a covered pathway for wards.	3M
Akuressa	PMCU Maramba	Damage to the roof		Repair of roof	0.2M
	DH Akurassa	Roof of the dispensary, OPD and ward no. 02 damaged due to strong winds. Well, pump house and water pump inundated.	Complete damage to the roof. Partial damage to the pump house.	Immediate reconstruction of the roof. Provision of an alternative water source to the hospital.	3M
	DH Ruhunugama	Roof of the ambulance garage damaged. Damage to the roof of the hospital.	Partially Partially	Repair of the roof of the ambulance garage and hospital roof. Removal of trees around the hospital which are a danger to its structures.	1.5M
Kotapola	PMCU Derangala	Earth slip		Remove of the dangerous trees.	0.2M
	PMCU Beralapanathara	Damaged drainage system. Inundated water motor.		Repair of drainage system. Purchasing new water motor.	0.5M
	DH Pallegama	Earth slip		Remove the soil	2.5M
	PMCU Dehigaspe	Damage to the roof		Repair of roof	0.3M
	PMCU Kotapola	Damage to the roof		Construction of retaining wall.	3M
Weligama	PMCU Denipitiya	Pending earth slip near the hospital.		Repair of internal road	1M
Hakmana	PMCU Hakmana	Damaged internal road of the hospital		Repair of roof immediately. Construction of retaining wall	0.5M 1M
	MOH Office Hakmana	Damage to the roof		Needs relocation to a safer place	2M
	Denagama MCH Clinic	Inundated every year due to floods	No equipment damage	Needs relocation	2M
Malimbada	Katuwangoda MCH Clinic	Situated in a high-risk area for landslides	No damage due to floods	Needs colour washing and purchase of equipment	0.2M
Mulatiyana	PMCU Makadura	Inundated water motor	No structural damage, Equipment damaged	Purchasing new water motor	0.1M

TABLE 133: ADDITIONAL RECOMMENDED REQUIREMENTS AND ESTABLISHMENT OF DISASTERS MANAGEMENT OPERATION CENTRE AT RDHS LEVEL

Item	Purpose	Quantity approximate	Value
Life jackets	Essential requirement when transporting health staff to affected areas through boats	10*12 MOH = 120	6M
Solar power system	Emergency backup power system during power failures and energy saving to disaster prone hospitals and MOH areas	12 institutions	20M
Mortuary coolers	Preservation of dead bodies for medico legal procedures during disaster situations	1*5 hospitals = 5	25M
Ambulances for disaster prone hospitals	Safe transportation of casualties during disasters to health care institutions	4	40M
Helipads	Air lifting of casualties from peripheral hospitals	1*5 hospitals = 5	25M
Buildings for accommodation of disaster management health team		3	100M
Bus for transportation of disaster management team		1	20M
Mobile laboratory	Equipped with mini lab facility and with other medical equipment (ECG, Multipara monitors etc.) facilities for mobile medical camps	1	20M
4 wheel cabs	Transport medical personals, drugs and equipment to affected areas	4	36M
4-wheel crew cabs	Maintain an uninterrupted drugs and medical supply throughout the district in a future disaster situation	2	15M
Motor boats	Transport medical personals, drugs and equipment to affected areas	2	10M
Mini boats	Transport medical personals, drugs and equipment to affected areas	2	2M
Establishment of disaster management operation center at RDHS level	App	Disaster management specialist	

1. RDHS Rathnapura

Divisional Hospital Ayagama (Type B)

Divisional hospital Ayagama is a type B divisional hospital with bed strength of 60 beds providing both inward care and OPD services. Around 150 to 200 patients receive outpatient care services daily at this institution. Hospital building is situated in a land slide prone area and all the access roads leading to the hospital are also at risk of earth slips. There are records indicating previous landslides in the vicinity of the hospital in last decade.

During recent floods, there was a major landslide in Ayagama Township and all the access roads leading to the hospital. Due to impending risk of landslides District Medical Officer decided to evacuate both patients and staff immediately from hospital premises. Hospital was evacuated to "Pradeeshiya Saba "building which is situated in a relatively safer location. No casualties or injuries reported during the evacuation.

At the present location, there is limited space to function a hospital. No sanitary facilities are available for both patients and staff. Mortuary has been arranged in makeshift reading hall at the Pradeeshiya Saba building. No separate space available for drug stores, dressing room and OPD consultation. No proper facilities available for clinical waste and garbage disposal. Electrical generator which was requested has not been delivered.

No damage to the hospital structure has been reported due to landslides and no equipment loss has been reported either.

NBRO report regarding the future risk of landslides is pending. Relocation of the hospital to a safer location is been suggested. Venue for relocation has not been identified yet. In short term for routine functioning of the hospital District Medical Officer requests following medical equipment.

Two spots lamps, one pulse oximeter, one defibrillator, two infusion pumps and one infant resuscitation table. In long term relocation of the entire hospital to a safer location is needed as the Ayagama divisional secretariat area is at constant risks of flooding and landslides. The cost of relocation of the entire hospital is estimated to be around 200 million.

Divisional Hospital Rassagala

Divisional hospital Rassagala a type C divisional hospital situated in the Balangoda MOH area caters to a mainly rural plantation sector population. It is a curative institution providing both OPD and clinic services. Dental surgery is also available at this institution. Around 150 patients receive outpatient care services daily at this institution.

During recent heavy monsoonal rain fall hospital was relocated to Ayurvedic hospital in the close vicinity due to land slide risk at the present location. There are previous records indicating landslides in the vicinity of the hospital resulted in casualties. A water channel runs through the property of the hospital which is suspected to be the main reason for earth slips around hospital. Walls of the ETU, Administration building and OPD are cracked and split lines are expanding. New split lines are appearing in the OPD building. There is a land slide risk at the vicinity of the hospital which threatens the structural integrity of the OPD building.

Relocated venue is situated at upstairs of the Ayurvedic hospital and accessibly to the floor is limited due to poor space. OPD, Dental Surgery, Drug Stores are functioning at the same floor with limited space. No patient waiting area is available. Kitchen of the Ayurveda hospital has been converted to a makeshift dressing room.

NBRO and National Geological Survey reports regarding the landslide risk is pending. New location for relocation of the hospital has been identified by the District Medical Officer. A bare land owned by the plantation company is identified as a possible location. The cost of relocation permanently is estimated to be around 20 million rupees.

2. RDHS Galle

Divisional Hospital Hiniduma,

A type B divisional hospital is situated in the MOH area Thawalama.It caters to a largely rural population and provides inward, OPD and Clinic facilities. Around 200 patients receive outpatient care services daily at this institution. Medical staff at this institution provides daily medical clinic services to around 100 patients.

During the recent floods due to overflowing of "Gin Ganga", hospital was inundated up to seven to eight feet. Staff and all possible equipment were evacuated to male ward which is situated in higher ground. But due to sudden and unexpected rise of water level considerable numbers of both medical and non-medical equipment were not salvaged. Three wards, Labor room, PCU and OPD were inundated and damaged. Drug stores were inundated up to 5 ft of water. Drug stocks available at the time of floods were destroyed. One of the medical officers' quarters was also inundated. Hospital ambulance was also caught up in the floods and need urgent repairs to be functional again. Medical equipment like infant warmers, sucker machines are damaged. Non-medical equipment like refrigerators, patient beds and cupboards were also damaged beyond repair. (The list of damaged equipment is attached herewith). Possible landslide risk exists in the vicinity of the general medical wards.

In long term relocation of the hospital to safer location has to be initiated due to constant risk of flooding.

PMCU Lankagama

Primary medical care unit Lankagama and maternal and child clinic Lankagama is situated in the MOH area Neluwa. The location of the dispensary is isolated and only access through Sinharaja forest reserve. It caters to a population around seven hundred people residing inside the forest reserve. It provides both outpatient and clinic services. It also conducts antenatal and vaccination clinic services through maternal and child clinic.

All the access roads leading to the institution has been flooded and blocked. Within first few days of the flooding all communications with the institution were lost. It was only accessible by air at the initial stage of the disaster. Access roads are blocked by earth slips and there is a constant danger of further landslides. In case of an emergency no evacuation routes exist. Due to rerouting of the river towards the institution there is further risk of flooding in the vicinity. Eminent landslide risk prevails at the vicinity of the institution that carries a risk loss of lives and damage to property. The medical officer who is in charge of the dispensary has to travel daily through a high-risk access road with constant threat of landslides to attend to patients.

NBRO report regarding the landslide risk is pending. NBRO team informed at time but could not visit due to poor accessibility. In short-term, a thorough risk assessment regarding the feasibility of the dispensary in the area is required. In long term relocation of the dispensary to a more accessible place has been suggested.

3. RDHS Matara

Base

Base hospital Deniyaya, A type B base hospital situated in the RDHS Matara caters to a largely rural population including a sizeable estate based population. It provides outpatient, inward medical services and clinic based services.

During the floods in 2003 hospital was affected due to landslides in the vicinity of the hospital. During recent heavy monsoonal rain and flooding there was an earth slip near the new administrative building and clinic complex which threatens the structural integrity of the buildings. Access road to the hospital was also damaged due to the recent floods. NBRO report regarding the landslide risk is pending.

In short-term a retain wall to contain the earth slip is required. In long-term a proper feasibility study before any new construction at the hospital site giving more emphasis on landslide risk is required.

List of prioritized health institutions by district

TABLE 134: ESTABLISHMENT OF DISASTER MANAGEMENT CENTER AT RDHS LEVEL

	Item	Quantity	Approximate Value
Human resources:	Disaster management specialist	1	
Materials:	Laptops	5	0.6M
	Desktop computer	2	0.2M
	Color laser printer	2	0.1M
	Fax machines	1	0.05M
	Photo copy machine	1	0.15M
	Smart tabs 10*	5	0.25M
	Smart monitor	1	0.1M
	Multimedia projector	1	0.25M
	Public addressing system	4	0.2M
	Round table	1	0.1M
	Camera	2	0.2M
	Glass cupboards	2	0.05M
	Executive chairs	5	0.1M
	Office tablets (4"*2")	5	0.1M
	Office chairs	10	0.1M

Job No	Institute	Describe the damage	Damage
1	DH -Galapatha HLC Clinic	Building partially damage	0
2	MCH Clinic Madurawela	Equipment & Furniture Fully damage	1
3	MCH Clinic Kapugedara	Colour Washing, Electricity, Retaining wall	2
4	MCH Clinic Palanda	Electricity, Repairing of fence	3.5
5	MCH Clinic Illuppotha	Colour Washing, Electricity wiring, Floor tilling	6
6	MCH Clinic Morapitiya	Colour Wash, Repairing of Plaster	2
7	MCH Clinic Naragala		0
8	MCH Clinic Veyangalla	Colour Wash, Repairing of roof, doors & windows repair, Electricity,20x20 new building	4
9	MCH Clinic Paragoda	20x20 new building	3.5
10	MCH Clinic Ihalawelgama		
11	MCH Clinic Diyakaduwa	Colour Wash, Electricity	0.5
12	MCH Clinic Molkawa	Colour Wash, Electricity	0.5

Job No	Institute	Describe the damage	Damage
1	PMCU-Lankagama	Awaiting NBRO Report	
2	MCH clinic Lankagama	Awaiting NBRO Report	
3	MCH clinic Happitiya	Inundated. Damaged to equipments and furniture	5
4	DH Neluwa	Generator / Ambulance	0
5	MOH Office Neluwa	Double Cab	0
6	DH(B) Hiniduma	Inundated. Damaged to equipments and furniture/*Ambulance	6
7	PHM Office Hiniduma	Inundated. Damaged to equipments and furniture	1
8	MOH Office Thawalama	Double Cab	0
9	DH Opatha	Generator	0
10	PMCU-Yakkalamulla	Awaiting NBRO Report	
11	MCH Clinic-Udumalagala	Painting of walls, provision of equipments and furniture	1

TABLE 134: ESTABLISHMENT OF DISASTER MANAGEMENT CENTER AT RDHS LEVEL (CONT.)

Job No	Institute	Describe the damage	Damage
11	MCH Clinic-Udumalagala	Painting of walls, provision of equipments and furniture	1
12	MOH-Yakkalamulla	Double Cab	0
13	PMCU-Kahaduwa	Painting of walls, provision of equipments and furniture	1.5
14	MCH clinic-Kahaduwa	Painting of walls, provision of equipments and furniture	1
15	MOH Office Elpitiya	Double Cab	0
16	MCH clinic-Welivitiya (North)	Painting of walls, provision of equipments and furniture	1
17	PHI Office- Ethkandura	Painting of walls, provision of equipments and furniture	1
18	MCH clinic & PHM Quarters, Akuretiya	Painting of walls, provision of equipments and furniture	2
19	MCH clinic WaduWelivitiya (south)	Painting of walls, provision of equipments and furniture	1
20	MOH Office Divithura	Double Cab	0
21	DH Nagoda	Repairs and painting (Generator / Ambulance no Allocation)	2
22	MCH Clinic & PHM Quarters – Mapalagama	Painting of walls, provision of equipments and furniture	1.5
23	MCH Clinic-Gonalagoda	Painting of walls, provision of equipments and furniture	1
24	MCH Clinic & PHM Quarters-Udalamaththa	Painting of walls, provision of equipments and furniture	2
25	MCH Clinic-Yatalamaththa (East)	Painting of walls, provision of equipments and furniture	1
25	MCH Clinic & PHM Quareters-Unanvitiya	Painting of walls, provision of equipments and furniture	1
27	MCH Clinic-Udugama North	Painting of walls, provision of equipments and furniture	1
28	MCH clinic-Paranathanayamgoda	Painting of walls, provision of equipments and furniture	1
29	PHI office-Nagoda		
30	PHI office-Mapalagama	Painting of walls,provision of equipments and furniture	1
31	PHM office-Thalgaswala	Painting of walls,provision of equipments and furniture	1
32	MOH Office Udugama	Double Cab	0
33	MOH Office Baddegama	Double Cab	0
34	MOH Office Imaduwa	Double Cab	0

Job No	Institute	Describe the damage	Damage
1	DH-Ayagama	Landslid prevention	20
2	DH-Rassagala	Landslid prevention	10
3	MCH Clinic-Palmadulla		
4	MCH Clinic-Hakamuwa		
5	MCH Clinic-Narangoda		
6	MCH Clinic-Watapotha		
7	PHM Office-Kiribathgala		
8	PHC-Kolombagama		
9	PHC-Pathakada		
10	PHM Office-Pohorabawa		
11	PHM Office-Millavitiya		
12	Weddagala-North (Kalawana MOH)	Essential Repairs	1
13	Hagalagamuwa (Kalawana MOH)		
14	Kukulegama (Kalawana MOH)		
15	DH-Pothupitiya		
16	MCH Clinic-Ellawala		
17	PHM Office-Pahalagm		

TABLE 134: ESTABLISHMENT OF DISASTER MANAGEMENT CENTER AT RDHS LEVEL (CONT.)

Job No	Institute	Describe the damage	Damage	
19	MCH Clinic-Kahangama			
20	PMCU-Pulugupitiya			10
21	PHC-Ketalianpalla			
22	PHC-Gurubevilagama			
23	PHC-Pelendagama			
24	PMCU-Ganegoda			10
25	PHC-Mihindugama			10
26	MCH Clinic & PHM Office-Hangamuwa			
27	MCH Clinic & PHM Office-Rajasisugama			
28	PHC-Hewayinna			
29	DHC-Wevila	Essential Repairs		0.1
30	DHC-Mitipola	Essential Repairs		0.6
31	DHC-Paligala	Essential Repairs		0.4
32	DHC-Mahiyangoda	Essential Repairs		0.1
33	DHC-Hindurangala	Essential Repairs		0.5

Job No	Institute	Describe the damage	Damage
1	BH Deniyaya	Earth slip in between OPD building and Administrative building	4
2	BH Kamburupitiya	Construction work of the well, alternative access road (* Generator)	0.15
3	DH Morawaka	Damage to Access road, Toilet pits, roof	3
4	PMCU Maramba	Damage to roof	0.2
5	DH Akuressa	Damage to roof, OPD and WD 2, well and pump house	3.5
6	DH Ruhunugama	Damage to the security fence, gate, roof and Ambulance garage	1.5
7	PMCU Derangala	Earth slip to the backyard of quarters	0.2
8	PMCU Beralapanathara	Damaged drainage system	0.5
9	DH Pallegama	Damage to roof	2.5
10	PMCU Dehigaspe	Damage to roof	0.35
11	PMCU Kotapola	Pending earth slip near the hospital (Retaining wall)	3
12	PMCU Denipitiya	Damaged to the internal road	1.2
13	PMCU Hakmana	Damage to roof	2
14	MOH Office Hakmana	Inundated by floods	2
15	MCH Clinic Denagama	High risk area for landslides (Retaining wall)	2
16	MCH Clinic Katuwangoda	Equipment damage	0.08
17	PMCU Makadura	Inundated water motor	0.1
18	MCH clinic & PHM clinic office Thanipita	Damage to roof partially immediat reconstruction	2.5
19	MCH clinic Pahala Maliduwa	Damage to roof partially immediat reconstruction	0.15

Agriculture

Damages and Approximate Recovery Cost of Livestock Sector in Selected Five Districts

TABLE 135: DAMAGES AND APPROXIMATE RECOVERY COST OF LIVESTOCK SECTOR IN SELECTED FIVE DISTRICTS
SOURCE: MINISTRY OF RURAL ECONOMICS AFFAIRS

Description	Hambanthota		Galle		Kalutara		Matara		Rathnapura		Total	
	No.	Approxymate Recovery Cost (LKR.Mn)	No.	Approxymate Recovery Cost (LKR.Mn)	No.	Approxymate Recovery Cost (LKR.Mn)	No.	Approxymate Recovery Cost (LKR.Mn)	No.	Approxymate Recovery Cost (LKR.Mn)	No.	Approxymate Recovery Cost (LKR.Mn)
Poultry	2332	1.3125	200	0.1	1000	0.3	3645	1.8225	262	0.131	7439	3.666
Cattle	24	2.4	620	62	500	30	945	94.5	16	1.6	2105	190.5
Buffaloe	12	1.44	31	3.72			20	2.4	26	3.12	89	10.68
Swine					1500	45					1500	45
Goat	11	0.165	86	1.29	50	1.5	213	2.925	27	0.405	387	6.285
Office Equipment & medicines		0.213		0.784				0.046				1.043
Damaged farms	6		10		2		85		53		156	
Total Recovery Cost (Mn.)		5.5305		67.894		76.8		101.6935		5.256		257.174

Industry and commerce

TABLE 136: AFFECTED NUMBER OF INDUSTRY AND COST OF DAMAGES
SOURCE: INSURANCE DATA

Type of Industry	Affected	Damage. LKR
Industry	21	12,434,045
Trade	90	10,294,100
Services	65	5,649,515
Personal	51	4,642,100
Total	**227**	**33,019,760**

TABLE 137: AFFECTED NUMBER & ESTIMATED COST IN INDUSTRY, TRADE AND SERVICES SECTORS IN DISTRICT WISE

	Galle		Hambanthota		Matara		Rathnapura		Kaluthara		Total	
	Number of Affected	Estimated cost	Number of Affected	Estimated cost	Number of Affected	Estimated cost	Number of Affected	Estimated cost	Number of Affected	Estimated cost	Number of Affected	Estimated cost
Industry	39	118612590	6	5395085	39	88803790	22	31435020	13	31751953	119	275998438
Trade	250	245928293	35	35683920	383	518132054.5	227	196396237.8	143	177258862	1038	1173399367
Service	66	36015334	16	110262892	113	70022273	117	267272825	38	20953715	350	504527039
Total	355	400556217	57	151341897	535	676958117.5	366	495104082.8	194	229964530	1507	1953924844

TABLE 138: TOTAL ESTIMATED COST OF DAMAGES INDUSTRY AND SERVICES DISTRICT WISE (FORMAL SECTOR)

District	Total estimated cost
Galle	662,272,267
Matara	1,116,342,765
Hambanthota	153,225,221
Rathnapura	563,800,421
Kaluthara	409,664,791

TABLE 139: AFFECTED ACTIVE WORKFORCE IN AGRICULTURE, INDUSTRY AND SERVICES SECTORS IN DISTRICT WISE

Impact on Employment									
District	Active workforce affected				Sector				
	Severely	Moderately	Total	%	Agriculture		Industry		Services
Galle	3,875	42,559	46,434	34.6	16,066	24.0	11,144	41.4	19,224
Kalutara	3,618	66,116	69,734	15.8	11,018	31.1	21,687	53.0	36,959
Matara	12,891	109,500	122,391	37.4	45,774	23.3	28,517	39.4	48,222
Ratnapura	22,552	81,844	104,396	37.2	38,835	27.5	28,709	35.4	36,956
Hambantota			–	36.6	–	26.2	–	37.2	–
Grand Total	42,936	300,019	342,955		111,694		90,057		141,361
Foraml (40.2%)					44,901		36,203		56,827
Informal (59.8%)					66,793		53,854		84,534

TABLE 140: AFFECTED ACTIVE WORK FORCE BY STATUS OF EMPLOYMENT AND FORMAL/INFORMAL SECTORS

Affected active work force by status of employment and formal/informal sectors						
Status of Employment	Total		Formal		Informal	
	%	Persons	%	Persons	%	Persons
Total	100	342,955	40.2	137,711	59.8	205,244
Employees	56.1	192,398	64.8	124,684	35.2	67,714
Employers	3.1	10,632	45.3	4,814	54.7	5,818
Own account worker	32.3	110,774	5.2	5,740	94.8	105,034
Contributing family worker	8.4	28,808	8.2	2,353	91.8	26,455

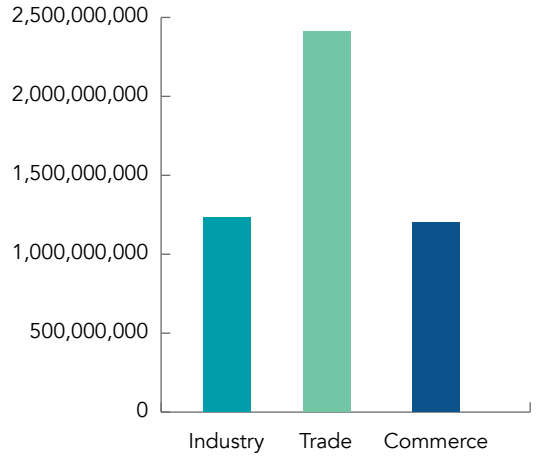

FIGURE 29: TOTAL ESTIMATED COSTS OF LOSSES BY TYPE OF ACTIVITY

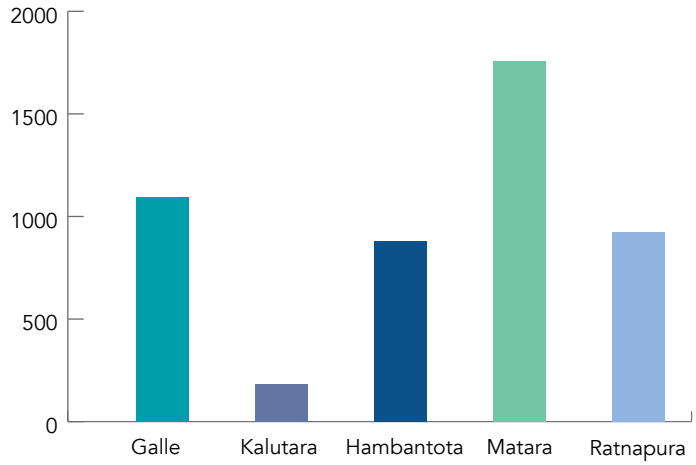

FIGURE 30: TOTAL ESTIMATED COST OF LOSSES BY DISTRICT

TABLE 141: SALARY LOSS IN THE FORMAL SECTOR

Salary loss in the formal sector						
Sector	Monthly Gross salary (LKR)	Affected persons	75%	Income Loss	25%	Income loss
Agriculture	16,138	44,901	33,676	271,729,627	11,225	362,306,169
Industry	23,807	36,203	27,152	323,206,808	9,051	430,942,411
Services	31,836	56,827	42,620	678,429,140	14,207	904,572,186
				1,273,365,574		1,697,820,766
Grand Total					LKR	2,971,186,340
					USD	19,807,908.93

TABLE 142: LOSSES CALCULATION FOR INFORMAL ENTERPRISES

Nature of damaged	District	Estimated losses of informal sector in industry and commerce sector			
		Industry	Trade	Services	Total
Totally Damaged Informal enterprises	Galle	2,359,125.67	10,225,927.07	4,328,851.98	16,913,905
	Kalutara	3,318,846.24	12,150,454.38	5,429,036.55	20,898,337
	Hambanthota	3,053,285.74	4,643,493.52	1,734,597.00	9,431,376
	Matara	6,976,436.13	25,661,681.53	13,037,090.04	45,675,208
	Rathnapura	4,683,951.30	23,466,936.22	10,433,477.88	38,584,365
Total		**20,391,645**	**76,148,493**	**34,963,053**	**131,503,191**
Partially Damaged Informal enterprises	Galle	38,447,695	163,953,488	68,969,573	271,370,757
	Kalutara	23,143,699	167,237,197	75,122,035	265,502,931
	Hambanthota	2,998,030	6,855,692	2,147,805	12,001,527
	Matara	32,393,594	214,384,734	115,150,929	361,929,256
	Rathnapura	11,716,010	134,031,584	59,657,077	205,404,671
Total		**108,699,027**	**686,462,696**	**321,047,420**	**1,116,209,142**

TABLE 143: INCOME LOSS IN THE INFORMAL SECTOR

Income loss in the informal sector					
Status of Employment	Total active work force affected	Informal sector		Monthly mean income LKR	Income loss
		%	Persons		
Employees	192,398	35.2	67,714	15,725	532,399,992.68
Employers	10,632	54.7	5,818	53,489	272,291,590.00
Own account worker	110,774	94.8	105,034	18,584	1,707,965,445.21
Contributing family worker	28,808	91.8	26,455		
				LKR	2,512,657,027.89
				USD	16,751,046.85

TABLE 144: ANNUAL TURNOVER AND NUMBER OF EMPLOYEES IN MANUFACTURING AND SERVICE SECTOR
SOURCE: NATIONAL POLICY FRAMEWORK FOR SME DEVELOPMENT, PAGE 3

Size	Sector Criteria	Medium	Small	Micro
Manufacturing Sector	Annual Turnover	LKR. Mn. 251 – 750	LKR. Mn. 16 – 250	Less than LKR. Mn. 15
	No. of Employees	51 – 300	11 – 50	Less than 10
Service Sector	Annual Turnover	LKR. Mn. 251 – 750	LKR. Mn. 16 – 250	Less than LKR. Mn. 15
	No. of Employees	51 – 200	11 – 50	Less than 10

Informal enterprises in affected districts and median asset value

TABLE 145: INFORMAL ENTERPRISES IN AFFECTED DISTRICTS AND MEDIAN ASSET VALUE

District	Micro		Ind. & Cons.		Trade		Services		Total	
	Num. of Estab.	Median (Lak Rs)	Num. of Estab.	Median (Lak Rs)	Num. of Estab.	Median (Lak Rs)	Num. of Estab.	Median (Lak Rs)	Num. of Estab.	Median (Lak Rs)
Kalutara	55965	2	13540	2	23554	2	18871	2	55965	2
Galle	44445	2	10808	2	18907	2	14730	2	44445	2
Matara	40030	2	12542	2	15133	2	12355	2	40030	2
Hambantota	29587	2	11170	2	10696	2	7721	2	29587	2
Ratnapura	40855	2	9299	2	18894	2	12662	2	40855	2
Total	210882	2	57359	2	87184	2	66339	2	210882	2

TABLE 146: FORMAL ENTERPRISES IN AFFECTED DISTRICTS AND MEDIAN ANNUAL TURNOVER

District	SMEs								MS							
	Small		Medium		Large		Total		Ind & Cons.		Trade		Services		Total	
	Num of Estab.	Median (Rs. '00,000)	Num of Estab.	Median (Rs. '00,000)	Num of Estab.	Median (Rs. '00,000)	Num of Estab.	Median (Rs. '00,000)	Num of Estab.	Median (Rs. '00,000)	Num of Estab.	Median (Rs. '00,000)	Num of Estab.	Median (Rs. '00,000)	Num of Estab.	Median (Rs. '00,000)
Kalutara	633	30	458	105	116	1061	1207	55	562	100	247	60	398	20	1207	55
Galle	499	28	383	100	82	811	964	55	330	140	237	53	397	20	964	55
Matara	387	50	269	110	48	354	704	75	239	114	183	90	282	40	704	75
Hmbantota	269	30	116	76	27	864	412	44	123	150	79	63	210	18	412	44
Ratnapura	584	13	325	107	61	502	970	35	500	35	200	60	270	15	970	35
Total	2372	29	1551	102	334	656	4257	53	1754	100	946	63	1557	21	4257	53

TABLE 147: TOTAL DAMAGES AND LOSSES (FORMAL & INFORMAL SECTORS) IN ALL FIVE DISTRICTS

Sector	Damages	Losses
Industry	423,002,476	811,047,139
Trade	1,466,347,161	944,315,182
Services	730,964,245	2,225,218,067
Total	**2,620,313,882**	**3,980,580,387**

TABLE 148: TOTAL LOSSES AND DAMAGES IN THE FIVE DISTRICTS (FORMAL & INFORMAL)

Informal	1,940,226,484
Formal	2,905,305,464
Total	**4,845,531,949**

Irrigation

TABLE 149: SUMMARY TABLE OF DAMAGES, LOSSES AND RECOVERY NEEDS OF MAJOR IRRIGATION SCHEME

Impact on Major Irrigation Schemes Managed by Irrigation Department					
District	Damages	Losses	Recovery Needs	Recovery Needs	
				Short Term	Medium Term
Ratnapura					
Kalutara	67.7	11.0	99.0	11.0	88.0
Galle	35.2	–	45.8	13.0	32.8
Matara	176.4	14.2	243.5	14.2	229.3
Hambantota	205.0		266.5		266.5
TOTAL	**484.3**	**25.2**	**654.8**	**38.2**	**616.6**

TABLE 150: SUMMARY TABLE OF DAMAGES, LOSSES AND RECOVERY NEEDS OF MAJOR FLOOD PROTECTION SCHEME

Impact on Major Flood Protection Schemes Managed by Irrigation Department					
District	Damages	Losses	Recovery Needs	Recovery Needs	
				Short Term	Medium Term
Kalutara	8.0	15.0	25.4	15.0	10.4
Galle	90.0	-	103.5	45.0	58.5 -
Matara	156.8	45.0	248.8	45.0	203.8
Hambantota	18.1	3.0	26.5	3.0	23.5
TOTAL	**272.9**	**63.0**	**404.2**	**108.0**	**296.2**

TABLE 151: DAMAGED AND RECOVERY INFORMATION IN RATHNAPURA DISTRICT

Area	CSC	MV Lines (33kV/11kV) No. of Poles			LV Lines – No. of Poles			No. of transformers			Consumers		
		Damaged	Restored	Balance	Damaged	Restored	Balance	Damaged	Restored	Balance	Affeted	Restored	Balance
Ratnapura	Ratnapura East	12	12	-	130	115	15	-	-	-	13,000	12,700	300
	Ratnapura Metro	4	4	-	35	35	-	2	2	-	12,000	12,000	-
	Kalawana	20	20	-	150	130	20	1	1	-	13,730	13,330	400
	Nivithigala	33	28	5	140	128	12	-	-	-	24,041	23,741	300
											62,771		
Eheliyagoda	Eheliyagoda	13	10	3	28	20	8	3	3	-	30,000	30,000	-
	Kuruwita	27	24	3	39	36	3	2	2	-	16,000	16,000	-
	Kiriella	45	25	20	200	50	150	-	-	-	20,000	17,500	2,500
											66,000		
Kahawatta	Kahawatta	1	1	-		12	10	2			8,000	8,000	_
	Balangoda	-				15	10	5			600	600	-
	Opanayaka	-				18	10	8			1,000	1,000	-
											9,600		
Embilipitiya	Godakawela	3	3	-20	20	20	-	1	1	-	5,000	5,000	-

TABLE 152: DAMAGES AND RECOVERY NEEDS ACTION POWER SUPPLY SECTOR IN RATHNAPURA DISTRICT
SOURCE: NDRSC

Province	District	Location		Description of Damages	Unit	Recover Action	Recover Action	Approximate Cost (RS)
		Area	CSC					
Sabaragamuwa	Rathnapura	Ratnapura	Ratnapura East	MV Lines (33kV/11kV) No. of Poles	12	Permanently Recovered	12	3,681,882.35
			Ratnapura Metro		4		4	1,227,294.12
			Kalawana		20		20	6,136,470.59
			Nivithigala		33		33	10,125,176.47
		Ratnapura	Ratnapura East	LV Lines – No. of Poles	130	Temperary Recovered	130	15,128,148.15
			Ratnapura Metro		35		35	4,072,962.96
			Kalawana		150		150	17,455,555.56
			Nivithigala		140		140	16,291,851.85
		Ratnapura	Ratnapura East	No. of transformers	-	Permanently Recovered	-	-
			Ratnapura Metro		2		2	3,444,000.00
			Kalawana		1		1	1,525,000.00
			Nivithigala		-		-	–
		Eheliyagoda	Eheliyagoda	MV Lines (33kV/11kV) No. of Poles	13	Permanently Recovered	13	1,994,352.94
			Kuruwita		27		27	4,142,117.65
			Kiriella		45		45	6,903,529.41
		Eheliyagoda	Eheliyagoda	LV Lines – No. of Poles	28	Temperary Recovered	28	3,258,370.37
			Kuruwita		39		39	4,538,444.44
			Kiriella		200		200	23,274,074.07
		Eheliyagoda	Eheliyagoda	No. of transformers	3	Permanently Recovered	3	4,125,000.00
			Kuruwita		2		2	2,600,000.00
			Kiriella		-		-	–
		Ratnapura	Kalawana	Depot Damage	1	Temperary Recovered	1	15,000,000.00
		Ratnapura	Kalawana	CEB Quarters	1		1	3,000,000.00
		Eheliyagoda	Kiriella	Depot Damage	1		1	9,500,000.00
		Ratnapura	Kalawana	LBS	1	Not yet recovered	1	1,800,000.00
								159,224,230.94

TABLE 153: DAMAGE DUE TO FLOODS PREVAILING IN THE SOUTHERN PROVINCE

District	Area	CSC	MV Lines(33kV/11kV)-No.of Poles				LV Lines No.of Poles			
			Damaged	Restored	Balance	Cost (LKR. Mn.)	Damaged	Restored	Balance	Cost (LKR. Mn.)
Galle	Galle	Galle	1	1	0	0.085	20	20	0	0.518
		Habaraduwa	1	1	0	0.105	15	15	0	1.851
		Bataduwa	1	1	0	0.175	24	24	0	1.237
		Thawalama	31	31	0	2.79	54	54	0	1.319
Total of Galle Area			34	34	0	3.16	113	113		4.93
Galle	Baddegama	Baddegama	4	4	0	0.25	8	8	0	0.125
		Gonapinuwala	2	2	0	0.22	6	6	0	0.125
		Thalgaswala	16	16	0	0.80	50	50	0	1.0
		Wanduramba	6	6	0	0.075	30	30	0	0.6
Total of Baddegama Area			28	28	0	1.345	94	94	0	1.850
Galle	Ambalangoda	Seenigoda	1	1	0	0.073	5	5	0	0.132
		Elpitiya	0	0	0	0	25	25	0	0.625
		Induruwa	0	0	0	0	0	0	0	0
Total of Ambalangoda Area			1	1	0	0.073	30	30	0	0.757
Hambantota	Tangalle	Tangalle	0	0	0	0	12	12	0	0.22
		Beliatta	0	0	0	0	40	40	0	0.74
		Walasmulla	10	10	0	0.47	54	54	0	1.03
		Angunukolapelessa	0	0	0	0	32	32	0	0.6
		Middeniya Sub CSC	1	1	0	0.05	44	44	0	0.86
Total of Tangalle Area			11	11	0	0.52	182	182	0	3.45
Matara	Weligama	Weligama	3	3	No	0.043	40	27	Pole	0.257
		Akurassa	51	32	Balance	1.279	135	152	alignments	1.09045
		Morawaka	22	24	Work	0.760	180	52	and	0.5395
		Deniyaya	20	41		0.821	160	208	other	2.68724
		Pasgoda	5	5		0.205	36	36		0.67181
Total of Weligama Area			101	105	-4	3.108	551	475	76	5.246
Matara	Matara	Kamburupitiya	7	7	0	0.400	48	48	0	2.16
		Hittatiya	1	1	0	0.100	33	33	0	1.485
		Matara	2	2	0	0.200	8	8	0	0.2
		Dickwella	0	0	0	0.000	23	23	0	1.035
		Hakmana	13	13	0	0.800	69	69	0	3.105
Total of Matara Area			23	23	0	1.500	181	181	0	7.985
Total of Southern Province										

	No.of Transformers					No.of Consumers			Other Damage(Type of the Damage)				Cost
	Damaged	Restored	Balance	Cost (LKR. Mn.)	Affected	Restored	Balance	Cost (LKR. Mn.)	Stores	Revenue(Meters)	B/S Meters	Cost (LKR. Mn.)	Total
	0	0	0	0	1200	1200	0	0.18	0	0	0	0.00	
	0	0	0	0	6100	6100	0	0.915	0	0	0	0.00	
	1	1	0	0.652	1700	1700	0	0.255	0	0	0	0.00	
	3	3	0	2.391	21500	21500	0	1.50	0	0	0	0.00	
	4	4	0	3.043	30500	30500	0	2.85	0	0	0	0.00	13.98
	0	0	0	0	16,000	16,000	0	0.24	0	1,500	0	0.375	
	0	0	0	0	8,000	8,000	0	0.06	0	10	0	0.025	
	1	1	0	0.70	22,000	22,000	0	0.30	0	2,000	5	5.175	
	0	0	0	0	20,000	20,000	0	0.18	0	250	1	0.66	
	1	1	0	0.70	66,000	66,000	0	0.78	0	3,760	6	6.235	10.22
	0	0	0	0	15,000	15,000	0	0.06	0	0	0	0	
	0	0	0	0	5,000	5,000	0	0.85	0	950	0	5.32	
	0	0	0	0	10,000	10,000	0	0.28	0	0	0	0	
	0	0	0	0	30,000	30,000	0	1.19	0	950	0	5.32	7.347
	0	0	0	0	4000	4000	0	0	0	LV-45,5M-100		0.27	
	0	0	0	0	6000	6000	0	0	0	LV-70,SM-120		0.39	
	0	0	0	0	12000	12000	0	0	0	LV-150,SM-300		0.88	
	1	1	0	0.67	8500	8500	0	0	0	LV-80,SM-202		0.51	
	1	1	0	0.67	10500	10500	0	0	0	LV-100,SM-250		0.64	
	2	2	0	1.34	41000	41000	0	0	0			2.69	8
	0	0	0	0	20000	20000	0	-		260		8.827	
	3	3	0	2.246	32000	31990	10	-		1575		38.34	
	0	0	0	0	10000	9992	8	-		865		17.745	
	2	2	0	2.213	15000	15000	2	-		986		27.119	
	0	0	0	0	9000	9000	0	-		230		6.369	
	5	5	0	4.459	86000	85982	20			3916		98.400	111.213
										other Damages			
	2	2	0	1.36192	26000	26000	0	2.34	0	3916		30	
	0	0	0	0	13924	13924	0	2.254	0			10.425	
	0	0	0	0	10000	10000	0	0.9	0			8.05	
	1	1	0	0.68096	8000	8000	0	0.72	0			2.946	
	1	1	0	0.83	15000	15000	0	1.35	0			1.296	
												1.125	
												0.38	
	4	**4**	**0**	**2.87288**	**72924**	**72924**	**0**	**7.564**	**0**			**54.222**	**74.143**
													224.903

TABLE 154: IMPORTANT ENVIRONMENTAL LEGISLATIONS AND AUTHORITIES IN CHARGE OF ITS IMPLEMENTATION

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 and
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 155: LOSSES OF THE GOVERNMENT

Categories	Total Cost (LKR)
Relief distribution	983,010,925.20
Logistic expenditure for response	11,014,991.34
Rehabilitation	1,667,466.35
TOTAL	**995,693,382.89**

TABLE 156: LOSSES OF THE UN AND NGO

United Nations	925,304,777
INGOs	341,466,041.1
Total	**1,266,770,818.05**

TABLE 157: MILITARY FORCES – EXPENDITURES INCURRED BY THE OPERATION

Categories	Total Cost (LKR)
Medicine	341,325.20
Transportation	11,014,991.34
Well cleaning	61,939.00
Rehabilitation	1,009,185.00
Renovation	596,342.35

TABLE 158: INFORMATION REGARDING WITH CLEANING (GALLE, MATARA, KALUTHARA & RATHNAPURA)

Cleaning sectors	Total number of units
SCH/GOVT Institution	14.00
House	27.00
Well	1,482.00
Gulley	44.00

TABLE 159: ESTIMATED EMERGENCY BUDGET REQUEST FOR PREPARED FOODS, DRIED FOODS AND FUNERALS

SOURCE: NDRSC

District	Expenditures (Rs)			
	Prepared Foods(Fresh)	Dried food	Funeral	Total (Rs)
Matara	164,707,200	69,357,400	3,200,000	237,264,600
Kaluthara	173,217,600	72,107,000	6,800,000	252,124,600
Hambanthota	9,411,300	3,404,800	500,000	13,316,100
Rathnapura	211,677,300	84,112,000	8,600,000	304,389,300
Galle	142,823,700	57,139,600	1,600,000	201,563,300
Total	**701,837,100**	**286,120,800**	**20,700,000**	**1,008,657,900**

TABLE 160: RELEASED EMERGENCY FUNDS FOR PREPARED FOODS, DRIED FOODS AND FUNERALS

SOURCE: NDRSC

District	Emergency Relief		Total Funds LKR.
	Received Funds from NIFT LKR.	Received Funds from Treasury LKR.	
	125,000,000	350,000,000	475,000,000
	Relesed Funds (NITF)	Relesed Funds (Treasury)	Total Released LKR.
Rathnapura	25,000,000	120,000,000	145,000,000
Kalutara	42,000,000	110,000,000	152,000,000
Galle	20,000,000	27,500,000	47,500,000
Matara	25,000,000	47,000,000	72,000,000
Hambanthota	6,000,000	8,000,000	14,000,000
Colombo	3,000,000	9,700,000	12,700,000
Kegalle	3,000,000	1,000,000	4000000
Gampaha	4,000,000	14,684,183.64	18684183.64
NDRSC		11,332,663	11,332,663
Total	**128,000,000**	**349,216,847**	**477,216,847**

TABLE 161: ANNUAL BUDGET ALLOCATION OF MDM AGENCIES IN LKR MILLION

	Institutions	2013	2014	2015	2016
Budgetary Allocation of agencies under the MDM	DMC	646.76	945	1509	978
	NBRO	114	312.3	501	569

TABLE 162: ANNUAL EXPENDITURE BY TYPE OF ACTIVITIES IN LKR MILLION

Categories	2012	2013	2014	2015	2016
Capacity Building	0.09	0.2	0.5	2.12	2.47
Mitigation projects	125.16	267.33	485.31	497.54	421.58
Awareness and preparedness	4.06	18.79	20.65	21.71	23.31
Flood mitigation	45.87	95.2	115	100	
Risk assessments	35.2				10.1
Equipment	18.59	21	74.98	47.06	71.8
Evacuation and rehabilitation		43.91	50	21.44	
Early warning system		6.87	8.17		
Recurrent NDMC*	8.52	9.39	11.85	0.34	1.4
Recurrent DMC	87.98	113.71	159.91	167.5	194.25

TABLE 163: MONETARY DONATION RECEIVED TO MINISTRY OF DISASTER MANAGEMENT

Name	Amount of fund (LKR.)
Main private companies	
Lanka IOC Plc	5,000,000.00
Hon Lakshman Wasantha Perera	266,605.00
Aitken Spence Travels (Pvt) Lyd	250,000.00
Hiroshi Aouch (Presidential Secretariat)	1,333,600.00
China Geo- Engineering Corp	500,000.00
China Construction Third Bureau First Engineering Co. Ltd	500,000.00
Dial Textile Industries Pvt Ltd	1,000,000.00
Adolf Ahlers Ag of Germany	1,000,000.00
Governments	
Royal Thai Embassy	8,964,589.87
High Commissioner of Bangladesh	*Not included
Consulate of Ireland	200,000.00
Other private companies and individuals	**17,638,633.26**
Total	**36,653,428.13**
High Commissioner of Bangladesh (USD 500,000)	76,724,890.63
Total Donation (LKR.)	**113,378,318.76**

TABLE 164: LKR. 10,000/= COMPENSATION FOR HOUSING DAMAGES RECEIVED BY FAMILIES IN DISTRICTS

District	No of people requested	Received fund for District Secretory (LKR.)
Galle	19333	193,330,000.00
Rathnapura	8479	84,266,000.00
Kalutara	14987	149,870,000.00
Matara	29262	292,620,000.00
Thrincomale	191	1,910,000.00
Mulatheew	29	290,000.00
Mahanuwara	118	1,180,000.00
Matale	42	420,000.00
Madakalapuwa	4	40,000.00
Colombo	1889	18,940,000.00
Wawniya	31	310,000.00
Gampaha	98	980,000.00
Kegalle	336	2,400,000.00
Hambanthota	830	8,300,000.00
Nuwara eliya	48	480,000.00
Total	**75677**	**755,336,000.00**
Received fund from NITF (LKR.)	**785,441,900.00**	
Received fund for District Secretory(LKR.)	**755,336,000.00**	
Remaining fund (LKR.)	**30,105,900.00**	

LKR. 7500/= housing rental fees

TABLE 165: LKR. 7500/= HOUSING RENTAL FEES RECEIVED BY FAMILIES IN DISTRICTS

District	No of families requested by District Secretory	Received fund for District Secretory (LKR.)
Rathnapura	1,701	38,272,500.00
Galle	455	10,237,500.00
Kaluthara	730	16,425,000.00
Kegalle	37	832,500.00
Hambanthota	24	540,000.00
Matara	602	13,545,000.00
Total	**3,549**	**79,852,500.00**

TABLE 166: COSTS INCURRED BY UN/HUMANITARIAN AGENCIES

Agency Name	Districts	Sectors	Emergency Funds (LKR)**	Own Budget Cost (LKR)*
ACTED	Ratnapura	Early Recovery, WASH	2,668,913	N/A
ADPC		Coordination		
ADRA Sri Lanka	Galle, Matara, Kalutara	Food Security, Shelter and NFI	30,116,400	15,750,000
Alliance Development Trust (ADT)	Galle, Kalutara, Kegalle	Child Protection, Food Security, Health, NFI/Hygiene, WASH	3,300,000.00	221,158.00
Americares	Kalutara, Ratnapura	Health	762350	3049400
A-PAD	Colombo, Galle, Gampaha, Hambantota, Kalutara, Matara, Ratnapura	Animal Protection, Coordination, Early Recovery, Food Security, Health, Hygiene, Information/ Needs Assessment, Search and Rescue, WASH	N/A	34,300,000
CBM/Navajeevana	Hambantota, Matara	Education, Health	N/A	1,760,250
ChildFund Sri Lanka	Galle,	Education, Protection		20,210,000.00
Direct Relief		Health		
Habitat for Humanity Sri Lanka	Galle, Kalutara	Shelter, WASH		
Handicap International	Matara	Shelter and NFI		
HELVETAS	Ratnapura	Early Recovery, WASH		
Humedica International Lanka	Galle, Matara, Ratnapura	Food Security, Shelter and NFI		
ILO	Kalutara, Ratnapura	Early Recovery, Emergency Employment Creation		4,600,500
International Water Management Institute (IWMI)	Colombo, Galle, Hambantota, Kalutara, Matara, Ratnapura,	Coordination		
IOM	Matara, Ratnapura	Health, Shelter and NFI	300,000,000	0
Islamic Relief – SL	Matara, Ratnapura	Food Security, Hygiene, Shelter and NFI		
Japan Emergency NGO	Ratnapura	Shelter and NFI		
LEADS	Galle, Hambantota, Kalutara, Matara, Ratnapura, Trincomalee	Education, Food Security, Health, Psycho-social Support, Shelter and NFI, WASH		
Muslim Aid	Kalutara, Matara, Ratnapura	Education, Food Security, Livelihoods, Early recovery		442,123.17
Oxfam	Kalutara, Matara, Ratnapura	Protection, WASH, Food Security,		
PARCIC	Matara	Education, Shelter and NFI	33,832,976	1,700,000
Peace Winds Japan	Kalutara	Shelter and NFI		
People In Need	Ratnapura	Early Recovery, WASH		
Plan International Sri Lanka	Matara, Ratnapura	Education, Protection, Shelter and NFI, WASH	99,000,000	89,000,000
Sarvodaya	Colombo, Galle, Gampaha, Kalutara, Matara, Ratnapura	Child Protection, Education, Shelter and NFI, WASH		
Save the Children	Galle, Matara	Child Protection, Education, Shelter and NFI, WASH		

TABLE 166: COSTS INCURRED BY UN/HUMANITARIAN AGENCIES

Agency Name	Districts	Sectors	Emergency Funds (LKR)**	Own Budget Cost (LKR)*
Sri Lanka Red Cross	Colombo, Galle, Gampaha, Kalutara, Matara, Ratnapura	Coordination, Food Security, Health, Search and Rescue, Shelter and NFI, WASH		
Team Rubicon UK	Matara, Ratnapura	Coordination, Shelter and NFI, WASH		5,352,470.93
UNFPA	Galle, Hambantota, Kalutara, Matara, Ratnapura	Health, Protection		32,937,275.25
UN-Habitat	Galle, Kalutara	Shelter and NFI	103,511,096.70	0
UNICEF	Galle, Gampaha, Kalutara, Matara, Ratnapura	Child Protection, Coordination, Education, Food Security and Nutrition, WASH	253,504,476	13,861,417
UNV	Colombo, Galle, Ratnapura	Coordination, Field Work, Relief		
WFP	Galle, Kalutara, Matara, Ratnapura	Coordination, Food Security	12,679,562	
WHO	Colombo, Galle, Gampaha, Hambantota, Kalutara, Kegalle, Matara, Ratnapura	Health	204,210,450	0
World Vision Lanka	Galle, Gampaha, Kalutara, Kegalle, Nuwara Eliya, Ratnapura	Assessment, Child Protection, Coordination, Food Security, Health, Search and Rescue, Shelter and NFI, WASH		
Totals:			**1,043,586,223.70**	**223,184,594.35**
Overall Total:			**1,266,770,818.05**	

Gender

Flood & Landslides 2017 May- Death Details

TABLE 167 : FLOOD & LANDSLIDES 2017 MAY- DEATH DETAILS
SOURCE: NDRSC

District	No.of Deaths	Male	Female	Children
Rathnapura	86	37	35	14
Kalutara	70	21	25	24
Matara	32	17	8	7
Galle	16	7	9	0
Kandy	1	0	1	0
Gampaha	4	2	1	1
Hambanthota	5	3	2	0
Kegalle	4	2	2	0
Colombo	1	0	1	0
Total	219	89	84	46

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