

**United Nations Development Programme**  
**Saint Lucia**  
**2014 Annual Work Plan**

**Project Title: Supporting Multidimensional Approaches to Poverty Eradication and Strengthening the Capacity of the Statistical Office**

**PROJECT DESCRIPTION (NOT MORE THAN 1/2 PAGE)**

**A. State the specific development challenge or gap that this AWP is addressing.**

As small island developing states (SIDS), OECS Member States face a plethora of development challenges which are characterised by their social, economic, environmental and political vulnerabilities. The small island of Saint Lucia is no exception. The Government of Saint Lucia and the UNDP Sub-Regional Office (SRO) for Barbados and the OECS have engaged in the successful implementation of development projects over several decades, and we continue to strengthen our partnerships and in particular, our work in the areas of data collection, social protection and disaster risk and recovery

The focus of the work of this annual work plan rests on Outcome 1 of the UNDP Strategic Plan 2014 - 2017: Growth and development are inclusive and sustainable, incorporating productive capacities that create employment and livelihoods for the poor and excluded

To this end, the National Statistical Office will be provided with support to undertake a multi-dimensional poverty index (MPI) as part of the harmonised Labour Force Survey conducted on a quarterly basis in Saint Lucia. Additionally, equipment and other capacity needs will be met as far as possible to ensure the achievement of this. Further to this, high level leadership and advocacy towards the adoption of multi-dimensional approaches to poverty measurement in the Eastern Caribbean sub-region will be supported by facilitating the participation of the Government of St. Lucia in the Multi-dimensional Poverty Peer Network of the Oxford Poverty and Human Development Initiative (OPHI).

Furthermore, post the flooding that took place on the island on the 24 and 25 December 2013, the UNDP supported the undertaking of a Post Disaster Needs Assessment, to provide the Government of Saint Lucia with information on the impact of the floods on the most vulnerable groups, in an effort to support more effective and targeted disaster risk and mitigation planning and response. This is in alignment with efforts towards multi-dimensional approaches to poverty measurement, whereby the linkages between poverty and vulnerability to and impacts of disasters on people and communities are recognised. The PDNA is in alignment with the thinking that the impacts of disasters can have lasting effects on the health and well-being of communities, and that the approach to mitigation and response has to be multi-dimensional and take into account socio-economic realities of everyday life.

**B. Select one or more of the below strategies for addressing the above mentioned challenge/gap and describe in the context of this AWP:**

- ✓ Changes in attitudes and access to decision making through awareness raising, brokering, convening
- ✓ **Changes in policies, plans, budgets and legislation through support to national assessment, planning, budgeting, policy making**
- ✓ Changes in the lives of individuals and communities through implementation for inclusive development

**C. List the possible improvements in the capacities of institutions, individuals and systems that will occur as a result of this AWP.**

This programme is designed to:

- Support evidence based policy formulation for social protection and poverty reduction through support for multi-dimensional approaches to poverty measurement, this in conjunction with the OECS Secretariat and other OECS Member states;
- Enhance technical services in managing for development results through the provision of support for capacity building among technical persons at the Statistical Department as well as through the provision of updated software and hardware for more efficient data collection, processing, analysis and distribution.

**D. List the gender issues in this AWP and specific ways in which they will be addressed.**

Efforts to build capacity in the area of multidimensional approaches to poverty eradication will address gender inequality in a number of areas including the development of a multidimensional poverty index to provide more accurate measurements of poverty for targeted, evidence based and gender responsive policy and programme development. The multidimensional approach to poverty eradication will also see an increased focus on and support for access to social protection with particular attention paid to supporting female headed households. This is to reduce vulnerability of women and children to acute poverty and reliance on the informal sector.

Additionally, the Post Disaster Needs Assessment (PDNA) report will establish the differential impacts and needs of females and males post the December 2013 flooding, with a view to support gender responsive recovery and future development planning on disaster risk reduction. The UNDP will use the experience in developing a PDNA for Saint Lucia to suggest ways in which poverty and social data can inform disaster management and response.

**E. List the South-South cooperation opportunities in this AWP and specific ways in which they will be addressed.**

Participation in the development and implementation of multi-dimensional approaches to poverty reduction will be undertaken in tandem with the OECS Secretariat and other OECS Member States. In particular, countries are engaged in the sharing of best practices in this area, with a focus on the adaptation of the harmonised Labour Force Survey (LFS) as implemented by the Saint Lucia Statistical Department. The Saint Lucia Statistical Department has taken the lead in exploring the practical application of a multi-dimensional poverty index which has been shared with statistical offices of the other OECS Member States.

Additionally, the Statistical Department will be seeking opportunities for collaboration and information sharing as well as technical inputs from the Oxford Poverty and Human Development Initiative (OPHI) and the National Institute of Statistics and Geography in Agua Calientes. As well, it will support efforts towards building a sub-regional network on multi-dimensional approaches to poverty measurement. This will be initiated through the participation of high level representatives to the OPHI Multi-dimensional Poverty Measurement Peer Network held in Berlin of 2014 as supported under this annual work plan.

**F. Risks and Implementation Challenges**

Key identified risks include potential delays in the distribution of survey results due to human resources constraints as well there is a need for a well-defined national process to discuss the results of the pilot and what the follow up process should be.

Programme Period:	January – December 2014
Key Result Area (Strategic Plan):	
Atlas Project ID:	00091404
Atlas Output ID:	00082506
Start date:	July 2014
End Date	31 December 2014
PAC Meeting Date	2014
Implementation modality	NIM

2014 AWP budget:	USD \$46, 000.000
MULTI YEAR INDICATIVE Budget	_____
<i>(Subject to the availability of the necessary funds to the UNDP)</i>	
• Regular	Regional TRAC USD 46 000
• Other:	
o Donor	_____
o Donor	_____
o Donor	_____
o Government	_____
In-kind Contributions	_____

Agreed by (Implementing Partner): \_\_\_\_\_

Agreed by UNDP: \_\_\_\_\_

**I. ANNUAL WORK PLAN YEAR: 2014**

**Key areas of UNDP Strategic Plan 2014-2017:**

**Outcome 1: Growth and development are inclusive and sustainable, incorporating productive capacities that create employment and livelihoods for the poor and excluded**

**UNDAF / CPAP OUTCOME/UNDP Strategic Plan 2014-2017 Outcome:**

**Primary Outcome**

- UNDAF Priority: Social protection and poverty reduction with a focus on vulnerable groups: Output 3.5 A framework for improved and harmonised measures of poverty that are specific to the SIDS context is developed

**Secondary outcomes**

- UNDAF Outcome 6: social, environmental and economic data collection is harmonised and access increased for use in policy and decision making processes at the sub-regional and national levels; Output 6.1 A regional framework of harmonised data definitions, concepts and indicators is developed and technical assistance is provided for socio-economic and environmental data collection and analysis

**CPAP OUTCOME Indicators:**

- Framework/report of harmonised regional poverty measures that include vulnerability, exclusion and risk concepts developed
- Number of poverty assessments, strategies, and/or national development plans that reflect harmonised measures of poverty
- Number of national level plans of action developed through national consensus implemented

**CONTRIBUTING TO M-CPAP OUTPUT:**

Programme Component: Poverty Reduction and MDG Achievement:

- Programme component result 1: By 2016, equitable and inclusive macro and sectoral national and sub-regional priorities are developed based on integrated collection and analysis of relevant economic, social, environmental and other data and based on measures of poverty and human development that capture the multiple deprivations of vulnerable groups. This will include: An integrated data framework for effective monitoring and evaluation and the development of inclusive, pro-poor policy
- Output 2: Improved national disaster risk management structures and mechanisms

**CONTRIBUTING TO CPAP 5 year target: Social protection and poverty reduction with a focus on vulnerable groups**

\*Please note that quarterly fund disbursements are contingent upon completion of quarterly activities and that no funds will be disbursed until outstanding funds are spent. Quarterly expenditures are indicated in the “quarterly output targets” specified below, and will be added to comprise the disbursement per quarter.

Annual OUTPUTS	PLANNED ACTIVITIES	Quarterly Output	RESPONSIBLE	PLANNED BUDGET
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		Targets				PARTY			
		Q1	Q2	Q3	Q4		Funding Source	Budget Description	Amount USD
<p>Output 1</p> <p>Strengthening the capacity of the National Statistical Office (NSO) to undertake a harmonised multi-dimensional poverty measurement</p> <p>Baseline: Weak and or inconsistent south to south collaboration on statistical development</p> <p>Target: To establish medium and long term relationships for south-south exchange in the area of statistical development</p> <p>Baseline: Lack of a harmonised measure of multi-dimensional poverty</p> <p>Target: To further develop and pilot a basic multi-dimensional poverty index (MPI) attached to the harmonised Labour Force Survey (LFS) for sub-regional utilitsation</p>	<p>1.1</p> <p>South – South exchange (e.g. with the National Institute of Statistics and Geography in Agua Calientes in Mexico) for the provision of technical support to undertake the adaptation of the Labour Force Survey (LFS) to include indicators that will address multi-dimensional poverty measurement (MPM)</p> <p>This will include: designing of the instrument for printing and uploading onto tablets computers for data capture</p> <p>The standardisation of the core multi-dimensional poverty index (MPI) questions across all of the instruments and expanded where more detailed questions occur</p>			x		<p>Saint Lucia</p> <p>Statistics Department, Ministry of Economic Affairs and where needed, UNDP SRO will lend support to facilitating external support to technical work</p>	<p>UNDP Core (TRAC)</p>	<p>Travel from Saint Lucia to Mexico</p>	<p>909.00</p>

<p>Baseline: Technological capacity deficits in the area of information technology in both hardware and software for efficient and timely data collection, processing analysis and distribution</p> <p>Target: The purchase of 2 software licenses, 20 tablet computers and 2 desktop computers</p> <p>Indicators: (UNDAF output 3.5) A framework for improved and harmonised measures of poverty that are specific to the context of SIDS</p> <p>Established relationships for south to south cooperation for strengthening statistical development</p> <p>A basic multi-dimensional poverty index (MPI) attached to the harmonised Labour Force Survey (LFS)</p> <p>Piloting of the basic MPI and a sub-regional review of the</p>									
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results for further refining and implementation in other countries – this will be facilitated through the review of the methodological approaches by the OECS Living Standards Measurement Committee									
	<p>1.3: Extend the software license for Stata 13, plus one new license of Stata 13 = \$2,385.00 US</p> <p>To allow for an update of the Stata license and to add one additional Stata License to ensure that more personnel can have access to the software and the programs to run the MPI</p>					Saint Lucia Statistics Department, Ministry of Economic Affairs in collaboration with UNDP should UNDP procurement services be required		Equipment Purchases	2, 385.00
	<p>1.3: Purchase of 20 tablet computers (Nexus 10 at least 16GB, plus covers and protective cases) at a unit cost of 500 US = 10,000 US</p> <p>These tablets will be used to strengthen the quality of the data generated by the LFS which is used to compute the MPI. It will also be the platform on which the MPI pilot for the expenditure modules will be conducted and will ensure that we</p>					Saint Lucia Statistics Department, Ministry of Economic Affairs in collaboration with UNDP should UNDP procurement services be required		ICT Equipment Purchases	10, 000.00

	are adequately prepared to accommodate more widespread use of this mode of data collection.								
	1.4: Software license upgrade for our database server, storage, archive and dissemination server, cost of SQL Server 2012 = 3,189 US			x		Saint Lucia Statistics Department, Ministry of Economic Affairs in collaboration with UNDP should UNDP procurement services be required		ICT Purchases	3, 189.00
	1.5: Two desktop computers and one server = \$ 4,000 US  Desktop computers used by supervisors to manage enumerators. Server computer used to install survey solutions software to run the tablet computer network at the Central Statistics office, this infrastructure will enable us to run the pilot and will be critical in running the full survey later.					Saint Lucia Statistics Department, Ministry of Economic Affairs in collaboration with UNDP should UNDP procurement services be required		ICT Purchases	4, 000.00
	1.6: Piloting process: MPI pilot module costs (in addition to regular harmonised LFS)  Costa of interviewing 225 households using different versions			x	x			Survey costs	6, 732.00



	<p>of the questionnaire:</p> <p>Short version (75 questionnaires) @ 15 US per questionnaire = \$1,125 US</p> <p>Short version with consumption module @ 25 US per questionnaire = \$ 1,857 US</p> <p>Long version (full version) @ 50 US per questionnaire = \$ 3,750 US</p>								
	1.7 National Pilot review meeting				x			National consultation	1, 500.00
<p>Output 2:</p> <p>Increase political leadership, and government and public awareness/ understanding of multi-dimensional poverty, to underpin a sub-regional multi-dimensional peer network</p> <p>Baseline:</p> <p>Lack of public awareness of and political leadership on multi-dimensional approaches to poverty measurement</p> <p>Target: Articulated and demonstrated political commitment and leadership on multi-dimensional approaches</p>	<p>2.1 Supporting attendance High Level travel of 2 Saint Lucia government representatives to the High Level Meeting of the Multi-dimensional Poverty Peer Network (DSA US\$506.70 per dayx7(x2) and terminals US\$280.35x2(x2))</p> <p>*Note: Travel and DSA/terminal costs are estimated</p>			x				High level meeting attendance	11, 285.00

<p>to poverty measurement</p> <p>Indicators</p> <p>The establishment of firm political support and leadership for the MPM</p>								
<p>Output 3: UNDAF Priority: Social Protection and Poverty Reduction with a Focus on Vulnerable Groups: Outcome 3: Improved social protection services and systems to reduce poverty and inequality</p> <p>Baseline: Lack of application of adequate multi-dimensional approaches to disaster risk mitigation and post disaster response, including the application of socioeconomic data collection methods and analysis</p> <p>Target: The utilisation of the results of the Post Disaster Needs Assessment (PDNA) for development planning and response to the recent flooding in Saint Lucia</p> <p>Indicator: Demonstrated</p>	<p>The PDNA implementation and report: This is meant to identify the needs of the most affected groups post the December 2013 flooding in Saint Lucia.</p> <p>It will inform the nature and level of Government support required and will provide an opportunity to further evaluate social protection services and systems requirements post disasters similar to this.</p>			x			<p>Application of results of PDNA Assessment in planning and implementation of recommendations</p>	3, 000.00

application of recommendations from the PDNA to address issues of poverty, resiliency building, addressing gender specific issues and addressing the psychological and other human services needs of affected communities								
<b>Sub-total in USD</b>								
	Logistical costs: Logistics, travel, communications/advocacy for sharing results of work/best practices							3,000.00
Sub-total programme management costs								
	<b>Annual Audit, Evaluations, Micro assessment costs<sup>1</sup></b>							
	<b>AWP TOTAL IN USD</b>							<b>46 000.00</b>
	<b>8% General management services<sup>2</sup></b>							
	<b>AWP GRAND TOTAL IN USD</b>							

1 Once a project has incurred expenditure for micro-assessment, do not budget for it in subsequent years.

2 This is chargeable on third party cost sharing

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## II. MULTI YEAR PROJECT STRATEGY DESCRIPTION (OPTIONAL FOR YEAR 1)

### Situation Analysis: General Overview

#### Output 1: Support to the National Statistical Office (NSO) for the Undertaking of a Pilot Basic *Multi-dimensional Poverty Index (MPI)*

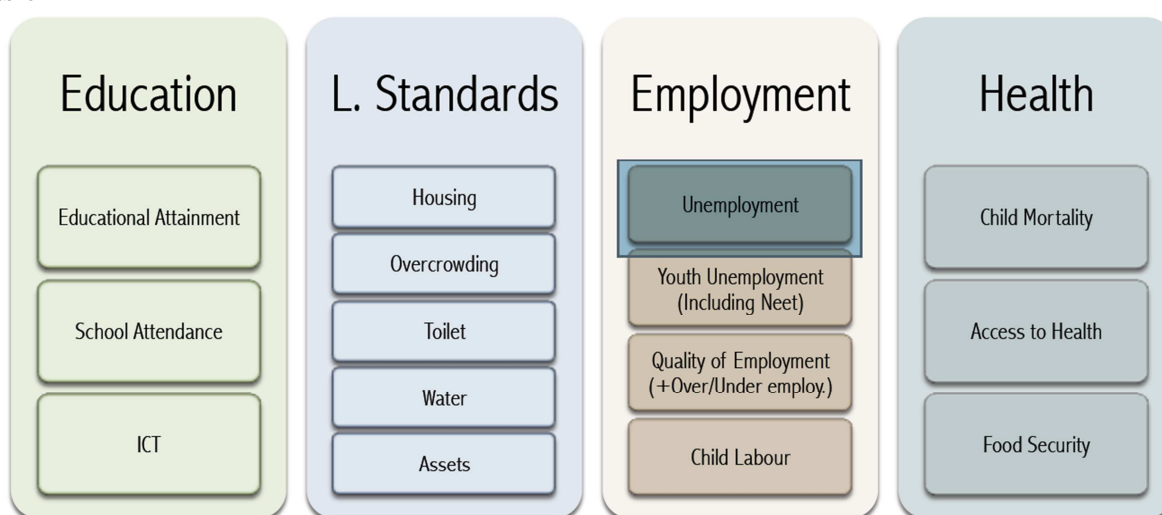
UNDP has been leading the efforts of the UN System, particularly in close collaboration with UNICEF and UN Women, and a group of partners including the Organisation of Eastern Caribbean States (OECS) Secretariat, the Caribbean Development Bank (CDB) and the World Bank, in providing support for the adoption of a Multi-dimensional Poverty Measurement (MPM) in the Eastern Caribbean. This new approach to poverty eradication and the reduction of social exclusion and inequality has been accepted in the global arena, and has gained recognition as a more effective and innovative approach to policy, planning and development initiatives for the achievement of poverty reduction goals in the Eastern Caribbean sub-region. The basis for the work lies in the reality that poverty assessments are not carried out with sufficient frequency to provide regular and current information for relevant policy development in the sub-region. Additionally, the definition of poverty and by extension monitoring and measurement of poverty levels has been limited to income/expenditure analysis (poverty line), rather than an inclusive analysis which recognises that poverty is linked to multiple dimensions of human development like education and health, with significant gender-related disparities. Additionally, the sub-region has been limited in its ability to influence key development agendas in the absence of more robust data and analysis on their specific needs as pertains to poverty reduction and addressing a myriad of other inequalities. Specifically, there is a need to critically engage in and inform the Post 2015 and SIDS agendas and the 2015 review of progress towards gender equality goals articulated in the Beijing Declaration and Platform for Action (Beijing + 20).

In addition, this work is aligned with the mandate of OECS, where the members of the OECS, through the OECS Secretariat, have been working towards the development and implementation of a sub-regional MPM through the OECS Living Standards Measurement Committee (LSMC). In addition to the OECS Secretariat, the LSMC is comprised of country representatives of National Statistical Offices (NSOs), and development partners including the UNDP, UNICEF, UN Women, the CDB and the World Bank, all of whom are involved in this effort. Over the last two years several activities have been undertaken towards a sub-regional MPM, including capacity building with technical persons and policy makers. In December 2012, UNDP held an Expert Group Meeting and Workshop on A Multi-dimensional Poverty Measurement (MPM) Methodology for the Caribbean, as part of a joint programme implemented in partnership with the OECS Secretariat and in collaboration with the CDB and UNICEF. A background paper was then commissioned to explore MPM methodologies, and a meeting was held in December 2013, bringing together 48 persons from the technical and policy-making fields from nine Eastern Caribbean countries including Antigua and Barbuda, and a number of development partners and UN Agencies. The key agreements of the December 2013 meeting at which the Government of the Commonwealth of Dominica was represented, were to: i) support the development and implementation of an annual multi-dimensional poverty index (MPI) through an adapted Labour Force Survey (LFS); ii) support the development and implementation of a five year MPI, through the adaptation of the four components of the CDB's Country Poverty Assessment (CPA); and, iii) to support advocacy for influencing key policy and strategic documents for example

legislative reform and national growth and development plans on social protection, poverty reduction and economic empowerment. At a recent meeting of the LSMC on the 14-15 April 2014 a piloting process was outlined and agreed in addition to the dimensions and indicators for an MPI adapted harmonised Labour Force Survey (LFS). Further to this, is the view to feed the MPM methodology into the Country Poverty Assessments (CPA).

It was decided that the basic MPI will consist of four dimensions: living standards, employment, education and health. This basic MPI will be computed based on data from the Labour Force Surveys (LFS), currently carried out in several countries of the sub-region. The main core survey already has information on the first three dimensions (partial in the case of education). A small number of new questions will be added to the questionnaire to complement this information.

### Basic MPI



A second (broader) MPI will be computed jointly with the release of the Country Poverty Assessments elaborated by the Caribbean development Bank. This additional measure will keep the four basic dimensions and include additional dimensions and indicators.

With regard to data collection for the HDR a study was commissioned by UNDP to determine the main data collection gaps in the sub-region, as well, as to identify needs and make recommendations for improvements in national data collection processes.

Key findings and recommendations of the report *Strengthening Capacity to Monitor Human Development in Barbados and the OECS: Issues and Constraints in Collecting and Disseminating Data, February 2014* included:

- Main issues to emerge from the research relate to a lack of financial and human resources to undertake labour force surveys (LFS), and lack of timeliness in collecting and coding educational and health data due to the utilisation of manual processes, lack of human

resources and lack of interconnectivity between agencies collecting data and those processing the data.

- Following from the above, there is a need for greater interaction between line ministries and National Statistical Offices (NSOs), in accordance with the harmonised approach to data collection among OECS member states.
- There is a need for a greater use of technology and a restructuring of the overall process of data collection, collation and analysis. High staff turnover at NSOs needs to be addressed in order to facilitate such restructuring, and the pivotal role of statisticians for national and sub-regional development should be highlighted, in order to increase human resources, increase motivation and reduce staff turnover through increased compensation, promotion of careers in statistics and continuous training.
- There will also need to be revision of policy and legal frameworks to reduce delays in data gathering and information sharing. Currently, the repository of certain types of data is the relevant line ministry, while access to certain records is restricted or constrained by bureaucratic procedures such as the issue with the Epidemiology Department in Saint Lucia accessing death certificates to allow for coding. While the details of specific policies and legal issues were not specifically investigated during the course of the research, at a general level the fragmented character of data collection and multiple contact points for international agencies to obtain data (ministries of health, education, finance, and NSOs) needs to be addressed.

Recent discussions with the heads of 3 statistical offices in the sub-region have revealed the following country specific needs, highlighted here to point out commonalities:

#### Saint Kitts and Nevis

##### Capacity building in:

- Sampling methods and techniques of quality control
- Weighting and Estimation; extrapolation of survey estimates to make inference on the population
- Training in the use of statistical software packages- SPSS, Eviews, Excel and others
- Data analytics - interpretation of survey data and report writing
- Training in the understanding and use of international methodologies

and standards including ISCO 2008, ISIC Rev4 and others

- Strengthening capacity to compile of comparative statistics in such areas as gender, ICT and environment, based on international methodological framework

#### Saint Lucia

- Acquisition of more tablet computers for more efficient data collection
- Data management support with a focus on software acquisition
- Data management support with a focus on capacity building for

website development and maintenance from where data can be easily accessed

- Open to exploring capacity building initiatives that will support decentralisation of certain data management duties, so as to circumnavigate human resources constraints - it was discussed that too many processes are dependent upon 1 or 2 persons, who despite having relevant training, are resistant to more efficient ways of doing things, and additionally, because certain key processes are centralised, if persons responsible are ill or on leave, things end up at a standstill - there may be technological alternatives which can reduce the impacts of this

## Grenada

- Support for a consultant for the development of the National Strategy for the Development of Statistics (NSDS). The NSDS will focus on harmonising data collection processes prioritising coordination, institutional strengthening, IT and legislation.
- Need to develop a process for the collection of environmental data - SEEA related support
- Tablet computers for LFS which will have its next round in July 2014: This will support the strengthening of the current process
- LFS data collection: need support re: weighting and estimation - currently researching how to do this re: the completion of data processing from the last LFS undertaken

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**Scope and Strategy:**

The Annual Work Plan for Saint Lucia for 2014 supports primarily the UNDP SROs efforts in the area of multi-dimensional poverty measurement, with some funds put towards the Post Disaster Needs Assessment (PDNA) of the December 2013 floods. The efforts to link the PDNA with multi-dimensional poverty measurement are based on the reality that social data is imperative to planning and responding effectively to pre and post disaster needs. Understanding disaster risk mitigation and response as multi-dimensional and impacting on poverty in all its dimensions is imperative to the reduction of poverty and deprivation to increase resilience, and decrease the vulnerabilities of the most marginalised groups. The PDNA (attached here as Annex 5) as noted earlier will aim to inform the social services response to the most affected groups, as well it will provide an idea of the institutional needs post disaster in terms of human services integration and the overall capacities required as pertains to social protection services for the reduction of vulnerability.

As pertains to multi-dimensional poverty measurement; Support to the Statistics Department in further elaborating and piloting a basic MPI will see the advancement of a tested basic measure, and the support to the Prime Minister and his attaché in Brussels will ensure that political commitment of the sub-region is visible. It will also reaffirm the leadership response in the sub-region itself.

The Statistics Department of Saint Lucia has been paramount to the development and promotion of a sub-regional multi-dimensional poverty index (MPI) and as such is a very good partner for the continuance of work in this area. Most recently the Department participated in a UNDP SRO funded panel on Multi-dimensional Poverty Measurement (MPM) at the CARICOM Second High Level Forum on Statistics, held in Grenada in May of 2014. As a panel representative, the Saint Lucia Statistics Department showcased its efforts in practical applications of a sub-regional basic MPI based on the adaptation of the harmonised Labour Force Survey (LFS) for the OECS.

The efforts on the MPI by the Statistics Department of Saint Lucia have had far reaching effects and will support the sub-regional efforts towards further piloting and in the provision of technical supports. Already the Statistics Department has been advocating as well as illustrating its work in the area on the MPI. At the moment, Saint Lucia has already successfully completed more than one round of the LFS and as such as demonstrated their capacity to effectively undertake the process.

The approach of this AWP as pertains to multi-dimensional approaches to poverty measurement is to enhance technical capacity as well as support high level leadership in advocating for increased resources and global recognition of the efforts of the sub-region. High-level leadership will also support the development of a sub-regional network/coalition on towards multi-dimensional approaches to poverty measurement and development planning. This is in an effort to accelerate progress towards a standardised sub-regional basic MPI and eventually, as explained earlier, to support an expanded 'full' measure.



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## Results framework:

Ultimately, by the end of the year the UNDP SRO and the Government of Saint Lucia would like to ensure the following results are realised:

- The A basic multi-dimensional poverty index (MPI) attached to the harmonised Labour Force Survey (LFS)
- The successful conducting of a pre-test of the MPI and the piloting of the MPI adapted harmonized labour force survey.
- Representation of Saint Lucia at the MPI network, on both global and sub-regional levels and support to the building of a sub-regional multi-dimensional peer network
- The formal adoption of multi-dimensional approaches to poverty measurement and specifically the MPI. This should see a high level discussion and definitive decisions made in this regard.
- The linking of the results of the PDNA with multi-dimensional approaches to poverty measurement

In terms of the overarching goals in support of multi-dimensional approaches to poverty reduction in the Eastern Caribbean Sub-Region, it is notable that the potential to accelerate progress toward these key results will be greatly enhanced through this support to the Saint Lucia Statistical Department.

These goals are as follows:

- Poverty reduction through a multi-dimensional, evidence based and harmonised sub-regional approach
- Transformational policy and planning for poverty reduction
- Strengthening national and sub-regional legal, policy and planning frameworks for poverty reduction and data collection and regulation in general
- Increase political leadership, and government and public awareness/ understanding of multi-dimensional poverty
- Enhance sustainability of MPM approaches through the development of a sub-regional coalition/network

### *i) Poverty reduction through a multi-dimensional, evidence based and harmonised sub-regional approach*

The use of a multi-dimensional approach to poverty measurement will ensure a comprehensive, relational and transformative approach to poverty reduction. By harmonising approaches to addressing poverty and in particular, acute poverty, the sub-regional ability to address pressing development issues will be enhanced. For OECS Member States this will positively impact their economic union as the needs of the population will be met, productivity increased and the general health and well-being of populations enhanced

### *ii) Capacity Building for Transformational Policy and Planning for Poverty Reduction*

As a first step, ensuring that statistical offices are equipped to implement multi-dimensional poverty measures is vital. Efforts will be made to ensure that the technical and technological requirements of statistical offices are met, as well, this will be linked to broader capacity building to be undertaken across sectors.

Poverty as a multi-dimensional issue can only be strategically and efficiently addressed through an integrated and multi-sectoral approach. The multidimensional approach to poverty measurement employs an integrated framework for action on poverty reduction, and will build capacities for an integrated approach to policy making, ensuring a coordinated approach to

national and sub-regional development. This will support the overcoming of a fragmented development agenda and process, and will contribute to comprehensive and sustainable growth and development.

Therefore, the provision of multi-sectoral, inter-institutional training and sensitisation for a cross section of persons engaged in policy and planning, technical activities and in communications and public education and advocacy will ensure that there is a society wide shift in thinking about and responding to poverty. Efforts will be made to substantively involve sectors that work and represent marginalized populations. These include, Social Development Ministries, National Women's/Gender Mechanisms, national and regional civil society organizations including women's NGOs, the UWI/Institutes for Gender and Development Studies, youth groups, persons living with disabilities, people living with HIV among others. This process should also support advocacy and input into shaping the Post 2015, SIDS and Beijing + 20 agendas, which all focus on commitments to the achievement of development results, particularly for marginalized populations, including those living in poverty.

A key component of this strategy, is the development and implementation of train the trainer programmes, and the identification of organisations that can provide training support to governments and others so that the MPM can be sustained. This should also be echoed in the policy framework and cost effective options for inclusive inter-ministerial training.

*iii) Strengthening national and sub-regional legal and policy data collection frameworks*

The successful piloting of the basic MPI will act as a starting point for discussing the required policy and legislative reform required for the success of these efforts towards evidence decision making and in support of the principals of democratic governance. Recent discussions at the CARICOM High Level Forum on Statistics held in Grenada in May 2014, revealed that several statistical offices are struggling to ensure that data collected and processed is actually available to the public, as Governments often intervene in what information can be released and what information must not be released. Several heads of statistical department expressed that they were exploring efforts to make national statistical offices autonomous and semi-autonomous bodies. This has re-emphasised the need to stress the importance of the relevance policy and legislative reform to produce the outcomes desired re: evidence based decision making.

The introduction of policy and legislation that will support mandatory application of a multi-dimensional approach to measuring poverty in the Eastern Caribbean, and as well, will regulate state data collection, analysis and application processes. This to ensure a transparent data collection process and to ensure application of information acquired to policy making, particularly for the achievement of development results for populations living in poverty, women and children and other marginalized populations. The goal is to ensure that evidence based policy making is mainstreamed into the development planning process.

Following on the above, the process will take some instruction from the successes of the Government of Mexico in developing a multi-dimensional poverty measurement (MPM), providing an opportunity for South-South Cooperation. The Saint Lucia Statistics Department has identified the Institute of Statistics and Geography in Agua Calientes to support this exchange.

The impetus for the development and implementation of an MPM in Mexico was the desire to be able to measure efficiently i) economic well-being and ii) the deprivation of social, cultural and environmental rights. This is with the ultimate view to increase access to and secure the social rights of those residing in Mexico.

This approach sought to marry the technical aspects of data collection with policy and service provision which would address structural inequalities through a transformative process. To facilitate this, the Government of Mexico established the “Consejo Nacional de Evaluación de la Política de Desarrollo Social (CONEVAL), a public institution bearing technical and administrative autonomy; its mission is to regulate and coordinate the evaluation of social development policies and programs and to establish the guidelines and criteria for the definition, identification and measurement of poverty (CONEVAL 2010, 9)”.

Following on this CONEVAL’s multidimensional poverty measure targets populations accessing social programs, which, were income based interventions, with a view to reform these to better meet the needs of those accessing them. Multidimensional poverty is therefore addressed through an assessment of well-being and also, through the assessment of access to human rights. Specifically and of prime importance to UNDP’s work:

*“In the wellbeing approach, the ...objective is to identify the dimensions and conditions that limit people’s freedom. It is assumed that every person, given her personal circumstances and preferences, develops the set of capabilities that define the range of life options she has reasons to value and that may choose among. If these options do not allow her to have an acceptable living standard in her society, that person is considered poor.*

*In recent years ... the approach to poverty based on human rights considerations has become increasingly important. This approach is based on the recognition of human rights as —the expression of the needs, values, interests and goods that, due to their urgency and importance, have been considered fundamental and common to every human being” (Kurczyn and Gutiérrez, 2009: 3-4).*

*Thus, it is considered that everybody should bear a series of indispensable guarantees for human dignity, which, having been adopted within the national legal framework and ratified through the signing of international instruments that protect them, become obligations of the Mexican State, which must create the mechanisms that will progressively allow full access to human rights for everybody (CONEVAL 2010: 19).”*

As noted above, the Government of Mexico’s commitment to a human rights-based approach to poverty eradication prioritises social and legal guarantees to ensure access to social and economic rights for the security of freedom, and the right of everyone to achieve well-being.

*iv) Increase political leadership, and government and public awareness/ understanding of multi-dimensional poverty*

This is the beginning of what will likely be a 3- 5 year process throughout which an effective Information Education and Communication campaign can be engaged, the goals of which would be to consistently provide public education and advocacy on multi-dimensional poverty, for a sustained shift in perceptions on the causes of poverty, and effective ways of

alleviating acute poverty. In the case of Saint Lucia, while there may not be an extensive effort in this regard, the pilot review process will entail some media reporting and the hope is that in 2015 this can be utilised further to build on the process as pertains to the engagement of a more public dialogue.

The purpose of engaging in public dialogue is to ensure that society is engaged in transformative action, and will be able to think innovatively about how to shift their circumstances for the better. It should also provide a foundation of knowledge on effective ways to address acute poverty, through which governments can be held accountable for their responses to the needs of the population. This should be cross cutting, employ consistent messaging tailored to fit the respective target audiences and provide avenues for public debate, as well as the distribution of data and political activities related to MPM in the Eastern Caribbean. Efforts will be made to ensure that people living in poverty, including poor women, young people and other disadvantaged groups are effectively represented and engaged in these public dialogues. Cost effective options for implementing this IEC campaign will include a coalition type engagement of development partners, government communications departments, NGOs and CSOs, community meetings and established communication routes on community, national and sub-regional levels.

*v) Enhanced Sustainability through Coalition/Network Building*

A key element of the overall project will be the establishment of a broad network of technical persons and policy makers, who can provide skills and expertise to governments and their partners on MPM development and implementation.

By supporting the Prime Minister of Saint Lucia, the Honourable Dr. Kenny Anthony in a championing role for multi-dimensional approaches to poverty measurement on a sub-regional level, as well as supporting his participation as an advocate in the global arena is setting a good foundation for the development and sustaining of the proposed sub-regional network/coalition.

This network should include technical experts in social vulnerability analysis including in gender analysis. Policy makers should be sensitised to the various tools available for ensuring that the results on an MPM measurement are used to track and monitor policy commitments to social inclusion principles. Examples of such tools and approaches include gender budget analysis and gender impact analysis and assessments.

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### **III. MANAGEMENT ARRANGEMENTS**

*Explain the roles and responsibilities of the parties involved in managing the project, oversight mechanism, fund management and project support staff.*

*Suggested sub-headings in this component may include:*

- *results of capacity assessment of implementing partner*
- *UNDP Support Services (if any)*
- *collaborative arrangements with related projects (if any)*
- *prior obligations and prerequisites*
- *a brief description/summary of the inputs to be provided by all partners*
- *audit arrangements*
- *agreement on intellectual property rights and use of logo on the project's deliverables*
- *Funds can be transferred as: a) direct payment to vendors or third parties for obligations incurred by the Implementing Partners on the basis of requests signed by*

*the designated official of the Implementing Partner; and b) direct payments to vendors or third parties for obligations incurred by UN agencies in support of activities agreed with Implementing Partners. Advance fund transfers shall be requested and released for programme implementation periods not exceeding three months. Reimbursements of previously authorized expenditures will be requested and released quarterly or after completion of activities. The UNDP shall not be obligated to reimburse expenditure made by the Implementing Partner over and above the authorized amounts. Also Partner needs to report interest earned immediately to UNDP through next submitted FACE Form.*

**The Saint Lucia Statistical Department will be the implementing partner for this annual work plan 2014 with assistance from the UNDP Sub-regional Office for Barbados and the OECS as required. Funds associated with the Post Disaster Needs Assessment (PDNA) will be disbursed to the relevant country partners, who will collaborate with the Statistical Department to ensure that funds are reported on accurately and in a timely manner. The Statistical Department will include all relevant materials and information on the PDNA as well as the outputs under this work plan in accordance with the reporting guidelines contained herein.**

---

#### **IV. MONITORING FRAMEWORK AND EVALUATION**

In accordance with the programming policies and procedures outlined in the UNDP User Guide, the project will be monitored through the following:

- A. **MONTHLY PROGRESS REPORT:** The Implementing Partner, in consultation with the project teams, will provide brief monthly updates on progress against planned activities and budgets. These monthly reports will be provided in the format provided at **Annex1**. These monthly reports will be consolidated, as required, by UNDP's quality assurance team for progress review meetings.
- B. **ONE TIME RISK LOG:** Based on the initial risk analysis, a risk log shall be activated in Atlas and regularly updated by reviewing the external environment that may affect the project implementation. This will be completed by UNDP project assurance team in consultation with the Implementing partner. Use the standard Risk Log template
- C. **QUARTERLY FINANCIAL REPORT:** The Implementing Partner (IP) will make use of the Funding Authorization and Certificate of Expenditures (FACE) to request for advances and report on expenditures made on a quarterly basis, or more frequently if agreed. The implementing partner must submit the FACE at the end of each quarter, within the first 10 days of the following quarter. Together with the FACE, the project has to send a copy of the bank statement as up to the date of the end of the period reported and the itemized cost estimates of the activities to be funded. The FACE form has to be certified by the designated official from the IP.
- D. In case a project **EVALUATION** is required, please indicate the justification and proposed timing for the evaluation. A project evaluation is required only when mandated by partnership protocols such as GEF. However, a project evaluation may be required due to the complexity or innovative aspects of the project.
- E. **ANNUAL REVIEW REPORT:** An Annual Review Report shall be prepared by the Project Manager and shared with the Project Board and the Outcome Board. The

reporting format at **Annex 2** will be used to provide a brief description of results achieved in the year against pre-defined annual targets.

- F. **ANNUAL PROJECT REVIEW.** Based on the above report, an annual project review shall be conducted during the fourth quarter of the year or soon after, to assess the performance of the project and appraise the Annual Work Plan (AWP) for the following year. In the last year, this review will be a final assessment. This review is driven by the Project Board and may involve other stakeholders as required. It shall focus on the extent to which progress is being made towards outputs, and that these remain aligned to appropriate outcomes.

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**V. LEGAL CONTEXT -- CLICK [HERE FOR THE STANDARD TEXT.](#)**

1. CPAP/UNDAF Action Plan countries where the country has signed the Standard Basic Assistance Agreement (SBAA)

[NOTE: The following Legal Context section contains the general provisions and alternative texts for the different types of implementation modalities for individual projects under the CPAP. The respective AWP for the individual projects will refer to the appropriate Alternative that applies to that project's implementation modality]

This document together with the CPAP signed by the Government and UNDP which is incorporated herein by reference, constitute together a Project Document as referred to in the Standard Basic Assistance Agreement (SBAA); as such all provisions of the CPAP apply to this document. All references in the SBAA to "Executing Agency" shall be deemed to refer to "Implementing Partner", as such term is defined and used in the CPAP and this document.

Alternative A [when the implementing partner is a government agency (NIM) or an NGO/IGO]

Consistent with the Article III of the Standard Basic Assistance Agreement (SBAA), the responsibility for the safety and security of the Implementing Partner and its personnel and property, and of UNDP's property in the Implementing Partner's custody, rests with the Implementing Partner. To this end, the Implementing Partner shall:

- a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;
- b) assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.

UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of the Implementing Partner's obligations under this Project Document [and the Project Cooperation Agreement between UNDP and the Implementing Partner] .

The Implementing Partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council

Committee established pursuant to resolution 1267 (1999). The list can be accessed via [http://www.un.org/sc/committees/1267/aq\\_sanctions\\_list.shtml](http://www.un.org/sc/committees/1267/aq_sanctions_list.shtml). This provision must be included in all sub-contracts or sub-agreements entered into under/further to this Project Document”.

**VI. ANNEXES**

**Annex 1 – Monthly progress report format**

<b>Project Title</b>						
<b>Implementing Partner</b>						
<b>Month/Year</b>						
<b>Quarterly Outputs</b>	<b>Planned activities</b>	<b>Month of completion</b>	<b>Responsible party</b>	<b>Budget</b>	<b>Monitoring framework</b>	
				Amount	Cumulative Expenditures	Progress towards meeting AWP annual outputs
<b>TOTAL</b>						



**Annex 2 – Annual progress report format**

<b>Key area of UNDP strategic Plan:</b>			
<b>UNDAF / CPAP OUTCOME</b>			
<b>CPAP OUTCOME Indicators</b>			
<b>CONTRIBUTING TO CPAP OUTPUT</b>			
<b>CONTRIBUTING TO CPAP 5 year target</b>			
<b>Project title</b>			
<b>Implementing partner</b>			
<b>Year</b>			
<b>Quarterly Outputs</b>	<b>Allocated budget</b>	<b>Total Expenditure</b>	<b>Progress on planned outputs and key successes</b>
<b>1</b>			
<b>2</b>			
<b>3</b>			
<b>Policy results and any additional results achieved</b>			
<b>Lessons learned, project shortcomings and solutions</b>			
<b>Follow-up Actions</b>			

### **Annex 3**

**Agreements:** as applicable, any additional agreements, such as cost sharing agreements, project cooperation agreements signed with NGOs<sup>3</sup> (where the NGO is designated as the “executing entity”) should be attached.

### **Annex 4**

**Capacity Assessment:** as applicable, results of capacity assessments of Implementing Partner (including HACT Micro Assessment)

## **Annex 5: POST DISASTER NEEDS ASSESSMENT – SAINT LUCIA**

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## **VII. ACKNOWLEDGEMENTS**

This Post-Disaster Needs Assessment report was undertaken on the instance of the Government of Saint Lucia after a previous rapid assessment executed jointly by the Government of Saint Lucia and the World Bank. That mission has largely utilized the methodology of the Damage and Loss Assessment that has in the past been followed in the aftermath studies of major destructive natural events in the Caribbean and further afield. In addition, it presents a section that addresses the recovery and reconstruction framework with indicative cost estimates of the recommended projects and their time frames. This report is the response to the request of the Government of Saint Lucia (GoSL) for assistance along the lines described above.

This report has benefited from and acknowledges the previous work of the World Bank and the Government of Saint Lucia whose findings have provided a reference point to the work of the present UNDP-led team. The fact of re-entry into the exercise of assessment has provided the team with updated information and statistics to input into the assessments. In addition, the assessment of the effect of the event on the macroeconomy and society has more fully been treated in the present document. The assistance of the GoSL through the integrative effort of the Ministry of Planning is hereby acknowledged with appreciation. Without the assistance of personnel from the ministries and organizations that are involved in the monitoring of the effects of the event this report would not have been possible.

These include:

- Cable & Wireless (LIME)
- Saint Lucia Air and Sea Ports Authority
- The Ministry of Agriculture, Food Production, Fisheries, Co-operatives and Rural Development
- The Ministry of Commerce, Business Development, Investment and Consumer Affairs
- The Ministry of Education, Human Resource Development and Labour
- The Ministry of Finance, Economic Affairs and Social Security
- The Forestry Department
- The Ministry of Health, Wellness, Human Services and Gender Relations
- The Ministry of Infrastructure, Port Services and Transport
- The Ministry of Physical Planning, Housing and Urban Renewal
- Ministry of Public Service, Sustainable Development, Energy, Science and Technology
- The Ministry of Social Transformation, Local Government and Community Empowerment
- The Ministry of Tourism, Heritage and the Creative Industries
- The National Emergency Management Organization
- Water Resource Management Agency
- Water & Sewerage Company

The Report was produced by a UNDP-led team that comprised the following:

Ian King, Coordinator, Michael Hendrickson, David Smith, Erik Blommestein, Lancelot Busby, George Alcee and Jacqueline Massiah.

## VIII. ABBREVIATIONS AND ACRONYMS

ATR	The ATR 72 is a twin-engine turboprop short-haul regional airliner built by the French-Italian aircraft manufacturer ATR.
BoP	Balance of Payments
CARICOM	Caribbean Community and Common Market
CDB	Caribbean Development Bank
CCRIF	Caribbean Catastrophic Risk Insurance Facility
CDEMA	Caribbean Disaster Emergency Management Agency
CIMH	Caribbean Institute of Meteorology and Hydrology
DaLA	Damage and Loss Assessment
DANA	Damage Assessment and Needs Analysis
DEWETRA	An ICT-based system for multi-risk forecasting, monitoring and prevention
DRR	Disaster Risk Reduction
DVRP	Disaster Vulnerability Reduction Project
EC	Eastern Caribbean
ECCB	Eastern Caribbean Central Bank
ECDPG/DM	Eastern Caribbean Development Partners Group on Disaster Management
ECLAC	Economic Commission for Latin American and Caribbean
EIA	Environmental Impact Assessment
EOC	Emergency Operations Centre
EU	European Union
EWS	Early Warning System(s)
GDP	Gross Domestic Product
GIZ	The world's leading provider of international cooperation services for sustainable development
GoSL	Government of Saint Lucia
HDPE	High-density polyethylene
IDA	International Development Association
LUCELEC	Saint Lucia Electricity Company
MIPST	Ministry of Infrastructure, Port Services and Transport
mm	Millimeter
MoA	Ministry of Agriculture, Food Production, Fisheries, Co-operatives and Rural Development
NEMO	National Emergency Management Organization
No.	Number
OAS	Organization of American States
OECS	Organization of Eastern Caribbean States
PAHO	Pan American Health Organization
PCU	Project Coordination Unit
PDNA	Post Disaster Needs Assessment
PVC	Poly Vinyl Chloride
SIDS	Small Island Developing State
SitReps	Situation Reports
SLASPA	Saint Lucia Air and Sea Ports Authority
SLU	Saint Lucia
sq km	Square Kilometer

UNDP	United Nations Development Programme
UNICEF	
US	United States
USAID	United States Agency for International Development
W&S	Water and Sanitation
WASCO	Water and Sanitation Company
WB	World Bank
WFP	World Food Programme (UN)
WRMA	Water Resource Management Authority

## IX. EXECUTIVE SUMMARY

### 1.1 Overview of Low Level Trough Event

Between the evening of December 24<sup>th</sup> and the morning of the 25<sup>th</sup>, heavy rainfall resulting from the passage of a weather trough resulted in significant flooding in St Lucia. These severe rains and high winds were due to a Low Level Trough System passing through the Eastern Caribbean, which impacted the islands of Dominica, Saint Lucia and Saint Vincent and the Grenadines. A synopsis of the event by the Caribbean Institute of Meteorology and Hydrology (CIMH) stated that the Low-Level Trough was itself under the influence of a mid to Upper-Level Trough. In addition, the orientation of the eastern side of the Upper-Level Trough significantly enhanced showers and thunderstorm activity over the states of the Eastern Caribbean.

The subsequent impacts of this intense downpour were exacerbated by the fact that previously there had been sufficient rainfall to result in saturated ground conditions.

#### Summary of Observations

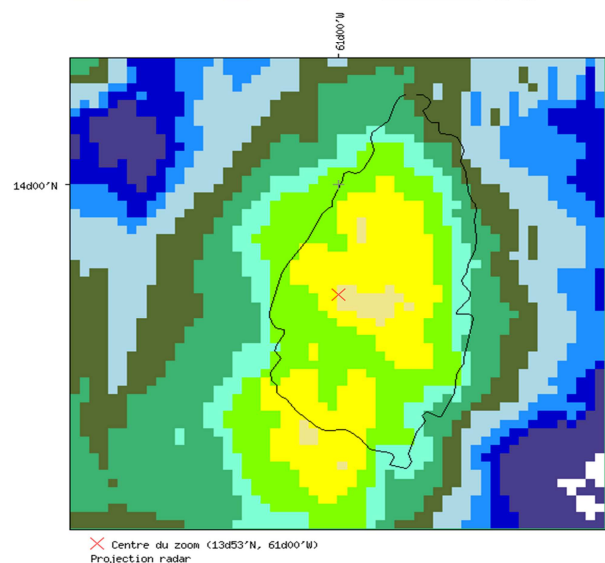
As the trough crossed Saint Lucia, initial rainfall rates were observed by Martinique Doppler Radar as being low and in the range of 5 – 10 mm/hour. By 17:00 the system had divided into two centers, one located over the central part of the island and the second located in the southern portion in the vicinity of Soufriere-Canaries (see image to the right). The storm centers affected interior areas with heavy rain which enveloped over 75% of the island's surface. Based on Doppler estimates, the core of each cell produced rain rates of between 75 – 100mm/hour with a larger outer band (yellow) producing an estimated 50-

ction de la Production



Radar de Diamant / Martinique (972): lame d'eau sur 1 heure  
le 24 Decembre 2013 a 22h 00' UTC  
- 28 km autour du point (13d53'N, 61d00'W)

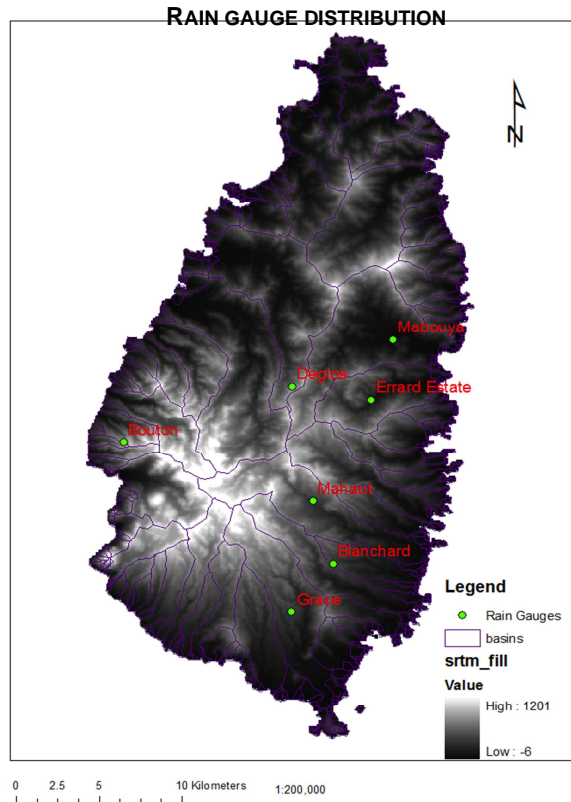
Figure 1: Martinique Doppler 18:00 24 December 2013



75mm/hour. The storm cells moved slowly to the east and the intense rain event continued until approximately 21:00 hours

The Saint Lucia Water Resource Management Authority (WRMA), which maintains a series of rain gauges on the island, reported an average of 353 mm of rainfall in 24 hours, ending at 8:50am on Christmas Day. Most of this was however, concentrated in a 4 hour period and it is likely that higher rates were received in upper elevations not equipped with gauges. In the peak hours of the event between 5:00pm to 8:00pm, the WRMA reported stations recording up to 251 mm of rainfall. Exceptionally high levels of rainfall occurred throughout the island during the event, however the southern districts of Saint Lucia received the highest recorded intensity of rainfall. In Laborie and Micoud, a maximum of 224 mm occurred while the northern district of Anse la Raye received the lowest recorded rainfall intensity at 94 mm.

Along the northern portion of the island, 308.6 mm of rainfall was recorded over the 24-hour period, but more importantly, 224 mm fell over a 3-hour period from 9 pm to 12 am.



### Historical Significance

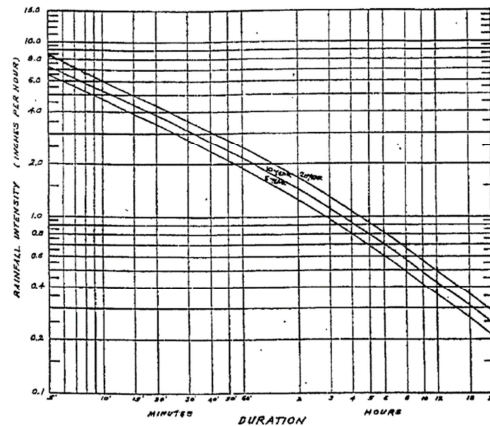
In an attempt to relate the severity of the event with historical record (i.e. return period), a combination of information sources was used. Rainfall curves are available for Saint Lucia, but only reflect a maximum 1:20 year return period (see diagram below) and this event registers well in excess of the available curve. A review of curves available for Puerto Rico (recognizing that these are indicative only and cannot be directly compared with Saint Lucia) suggest the 3 hour rainfall intensity may have been in excess of a 1 in 100 year event. In support of this, interviews with affected persons (elderly persons could not remember an event this intense) and staff at the

national meteorological office provided confirmation. Additionally, prior to the event, rainfall had already saturated the surface soils creating optimum conditions for maximum surface runoff. Several witnesses reported unusual lightning and thunder activity that were associated with the storm, further confirming that the system was unusually intense. Rainfall was largely focused on the central and southern portions of the island where the topography is mountainous and includes the highest elevations. Storm interaction with the island topography in this area



most likely contributed to the high rainfall rates experienced. Most of the rainfall was experienced over the central mountain range where eastern and western watersheds converge.

**Fig. 2 – Rainfall curves for Saint Lucia**



The intense rainfall converted rapidly to a major flash flood event for most of the streams on the central and southern portions of the island and provoked major landslides (12 Districts affected; Sarrot, Gros Islet, Babonneau, Anse- La- Raye, Castries North, Castries Central, Castries East, Canaries, Dennerly, Micoud South, Vieux Fort South, Soufriere). Castries experienced flooding originating in the upper watersheds and flood intensity increased to the south, while in Anse-La Raye the entire village was flooded. The southern portions of the island suffered major flooding along principal rivers and tributaries, and this severely damaged or destroyed public and private infrastructure. Flood waters affected roadways, bridges, drinking water and power distribution infrastructure. River banks became inundated and flooding occurred in most of the communities along the western highway, affecting residences, healthcare infrastructure, and several schools. Additional flooding occurred along the Vieux Fort River, including at the Hewanorra International Airport and adjacent residential and business districts in Vieux Fort. In many locations, flooding was exacerbated by poor local drainage infrastructure. One section of the main highway on the east coast just north of Vieux Fort collapsed due to insufficient drainage structures. Sediment deposits restricted the flow at river mouths, worsening initial flooding in low-lying communities. Landslides restricted road access at a number of locations, principally along the western highway. Throughout the island a number of bridges were compromised or washed away and there were widespread debris flows.

The impacts of the event were magnified significantly by several factors. These included persistent rainfall throughout the week leading up to December 24, which reduced the soil's capacity to absorb additional rainfall. The presence of significant debris, including several landslides, initially noted during Hurricane Tomas in 2010, was again observed during the December 24 - 25 event. Finally, since the event occurred in the late afternoon/early evening, many persons were

out doing Christmas shopping and became stranded. Several persons were unable to return home, as access into and out of Castries was blocked.

### **Climate Change Implications**

The question must now be posed, as to the role that climate change may be having on events of this nature. This is particularly relevant in the consideration of the relative frequency of flooding events. While it may be prudent for the GoSL to adopt design criteria for the 1-in-50, or 1-in-100 year events for national infrastructure, the impacts of climate change may serve to render these extreme events more frequent, thereby prompting the need for a detailed review of expected climate change impacts on rainfall, drought, and storminess.

#### **1.2 Affected Population and Labour Force**

The Primary Affected Population is defined as those who live **in** the disaster-affected geographical areas, who sustained the direct effects of the disaster such as death and injuries and who required shelter, food and medical attention and/or who lost their physical assets. Some 1,200 people were evacuated into shelters at the onset of the event. Although the majority returned to their homes after the first night, on 25 December there were still at least 175 people in shelters who remained there for a number of days after the event. Some 550 persons were displaced and approximately 20,000 persons were directly affected.

The Secondary Affected Population is defined as those who live **within** the disaster-affected geographical area and who sustained indirect effects of the disaster (losses). The indirect effects included: the interruption of basic services (water supply, sanitation, electricity, transport and communications), losses in production of agriculture, livestock, fishery, industry, commerce, mining and tourism activities, and higher costs in receiving goods and services. Some six thousand persons not including the primary affected population fell into this category.

The Tertiary Affected population is defined as those who live **outside** the disaster-affected geographical area who sustained secondary effects of the disaster, such as: increased costs of transportation to the affected areas, scarcity or higher costs of goods and services originated from the affected areas, lack or insufficiency of goods and services due to reallocation of public resources to the affected area. The damage to the Agriculture Sector caused shortages of food, higher prices and a general disruption in the life of the entire country for some time after the event. To this extent, some 143,000 persons may be considered to have suffered the tertiary effects of the trough system.

Although Saint Lucia has been graduated to being an upper-middle-income small island state, it has retained some of the characteristics of many countries in the Eastern Caribbean. Its production structure, while being somewhat more diversified than that of its OECS partner states, still strives toward the achievement of global competitiveness. Tourism is seen to be the main foreign exchange earner and all attempts are being made to enhance the tourist product, especially in view of the reversed fortunes of the banana industry in recent years. An element of cultural tourism has been embraced in the strategy to grow the sector.

The following table highlights the GDP performance.

**Table 1**  
**Gross Domestic Product by Economic Activity – Current prices**  
**EC \$ million**

	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Agriculture, Livestock and Forestry	95.58	73.79	62.86	71.33	73.06	75.95
Fishing	20.52	20.73	21.15	21.57	23.53	24.48
Mining & Quarrying	7.06	6.99	6.95	7.18	6.91	7.22
Manufacturing	108.30	103.53	110.89	109.63	103.53	106.66
Electricity and Water	115.82	118.11	113.44	117.02	120.91	125.67
Construction	249.77	231.98	238.32	228.74	212.55	220.05
Wholesale and Retail Trade	218.97	219.38	263.67	259.22	210.49	217.92
Hotels & Restaurants	334.50	458.18	449.16	479.18	500.53	515.65
Transport, Storage and Communications	485.78	562.92	574.02	579.55	590.28	608.60
Financial intermediation	218.56	186.95	177.42	178.10	179.64	184.67
Real Estate, renting & Business Activities	472.98	494.84	523.96	538.84	550.98	569.84
Public Administration, Defense & Compulsory Social Security	173.52	187.26	201.97	211.96	220.50	227.16
Education	118.24	126.99	130.34	130.86	133.56	137.60
Health and Social Work	52.15	54.00	57.79	63.59	67.36	69.40
Other Community, Social & Personal Services	125.19	137.48	151.64	151.26	155.83	160.53
Activities of Private Households as Employers	3.69	3.81	4.16	4.10	4.22	4.35
Less FISIM	73.60	67.07	63.63	62.52	65.20	67.83
Gross Value Added in Basic Prices	2727.04	2919.88	3024.12	3089.62	3088.68	3187.92
Gross Domestic Product at Market Rates	3185.93	3381.37	3499.73	3559.52	3596.48	3719.68
Growth Rate of GDP	(0.34)	6.13	3.50	1.71	1.04	3.43

Source: CSO, Saint Lucia and ECCB.

### 1.3 Social impact assessment

The social impact of an event does not lend itself to quantification in the same manner as can the economic impact. A Social Impact Assessment (SIA) includes the processes of analysing and monitoring the intended and unintended social consequences, both positive and negative, of events or interventions (policies, programs, plans, projects) and any social change processes that may have occurred. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment using primarily a qualitative method of research. This approach explores issues in order to understand phenomena and answer questions. Among the interventions are focus-groups, in-depth interviews, content analysis and literature reviews. An SIA does not introduce or manipulate variables.

The SIA team conducted “walk-throughs” in the communities of Anse La Raye, Canaries’, Soufriere, Vieux Fort and Marc/Bexon over a period of two days.

The SIA recommendations can be used to develop strategies for responding to recovery and reconstruction in the social sectors.

The main incidence of damage was to poor communities where settlements are located along river courses and generally in at-risk areas such as flood plains. In these areas people earn their livelihood by engaging in one or more economic activities that cater mainly for the localized market, with the exception of a few cases where the production of a commodity has become associated with an area. An example of this would be bread produced in one such area that has become almost nationally known and appreciated. In such a case, the economic effect of damage to the production facility can be measured.

What cannot be measured is the devastation and pain of poor people who have lost their few belongings and their livelihoods. In national-scale economic terms their damage and losses are hardly felt but the impact on the poor communities is significant. In events such as the December trough, what can be seen is the wealth of the social capital that exists in these communities as neighbours come out to the assistance of those more directly affected than themselves, as a matter of priority. The effects on those communities and by extension on the rest of the Saint Lucian society as a secondarily affected set may become manifest and remain for some time as demonstrations of anger and a sense of deprivation may threaten public safety. Social remedial projects such as the return to happiness initiative should be implemented and constantly be reviewed in an attempt to build on the social capital and harness it for the development of those societies and ultimately of the nation. The extent to which psycho-social trauma is confronted will determine the rapidity of a return to happiness which, combined with environmentally aware maintenance projects, can lift the level of living of the constantly affected communities that live in hazard risk areas.

Unlike the projects that require vast sums of financing to build brick, steel and mortar structures, social initiatives may require less financing but will provide a capacity that is absorptive of the adoption of risk-reducing behaviours that must be one major objective of planning. The social impact of an event may last for years after the event. To this extent, policies should address the shortening of the period of impact after the event, especially if the impact has had a negative effect.

#### **1.4 Response of Government and Development Partners**

##### **National**

The Government of St Lucia did not declare an emergency or disaster, however the Emergency Operations Centre at the National emergency Management Office was activated and the various response mechanisms operationalized. This included the volunteer structures such as the Youth Emergency Action Committee, the St Lucia Cadet corps and the National and District Disaster Committees. The EOC was de-activated on 3<sup>rd</sup> January 2014 although coordination of relief supplies, rehabilitation and some aspects of recovery were continued through the NEMO Secretariat.

Noting the impacts realized that included flooding to homes and public buildings, disruption of water supplies and landslides, and impact to the north south communications corridor, national efforts centered on a comprehensive damage and needs assessment, re-establishing the disrupted infrastructure, alleviating the impact on the affected population. The supply of water was a priority area.

Situational reports were issued by NEMO as well as damage and needs assessment reports, the first of which came 48 hours after the impact.

## **Regional and International**

The ECDPG/DM, which is co-chaired by the Caribbean Disaster Emergency Management Agency (CDEMA) and the UN Resident Coordinator met several times following the event and determined how best to support affected countries. Through individual partner agencies including CDEMA, this organization communicated with the affected countries through their national disaster mechanisms. The ECDPG/DM met on 27 December and on an ongoing basis thereafter. Additionally, led by CDEMA and facilitated by the Regional Security System, a team visited the three affected countries to meet with the political leaders and disaster management officials. The development partners reported the following support in relation to the needs identified by St Vincent and the Grenadines and the other countries:

- International Financing Institutions
  - The Caribbean Development Bank (CDB) and the World Bank (WB) both considered infrastructural challenges faced
  - The WB undertook a rapid damage and loss assessment with a particular focus on infrastructure
  - The CDB made an emergency cash grant available to support assessment and recovery to a total of USD 200,000 and an immediate response loan (IRL) of USD 750,000 for immediate response
- Bi-lateral donors
  - The UK Aid agency made EC\$1 million available for Saint Lucia and Saint Vincent and the Grenadines through PAHO to be split almost evenly between the two countries. The funding is based on the needs assessment in country provided by PAHO.
  - USAID made USD 50,000 available for recovery through the Red Cross Society
  - The European Union through Humanitarian Office ECHO has provided Euro 100,000 available through PAHO to facilitate recovery of the Milton Cato Memorial Hospital
  - The Canadian DFTAD provided CAN\$ 20,000 to the Red Cross Society for its work
- UN System
  - UN RC accessed OCHA emergency cash grant of USD 15,000 for immediate needs
  - PAHO supported the assessment of the impact on medical facilities and accessed resources from donor agencies to support immediate needs and recovery
  - UNICEF considered the needs of youth and the educational sector and also facilitated the return to happiness program in the countries
  - UNDP supported the UN RC including the functioning of the ECDPG/DM. In addition, UNDP has coordinated a Post Disaster Needs Assessment (PDNA)
- CARICOM Countries
  - Caribbean countries including Trinidad and Tobago, Barbados and St Kitts and Nevis provided food and medical supplies, materials, experts and financial support to the government. It has been estimated that this

support exceeded that of multilateral and bilateral agencies and was influenced by the initial reports and discussions with local officials and later by the more substantive damage and needs assessments.

#### **1.5 The Post Disaster Needs Assessment Methodology (PDNA)**

The PDNA is an integrated framework for assessing disaster effect and impact across all sectors and geographic subdivisions of a country. It has at its core a number of guiding principles of humanitarianism, impartiality and neutrality.

The PDNA acknowledges national ownership of the process. It is therefore a Government-led process with the fullest possible engagement and leadership of national authorities in the assessment, recovery planning and implementation. It provides coordination at all stages of the process and at all levels, ensuring collaboration and partnership between the UN, the WB and the EU as well as with the National Government and all key stakeholders. The tools used in the conduct of the PDNA are based on the tried and tested damage and loss assessment methodology developed in the Latin America and Caribbean region of the United Nations at the Economic Commission for Latin America and the Caribbean.

The methodology has at its core, a consistent approach to the valuation of the effects of a disaster on a society and its economy. Its rigour derives from its adopting of the National Accounting framework as its anchor. It is a “bottom-up” approach, capturing the information about the effects of the event, sector by sector and aggregating this data to arrive at the total effect of the event. It is a simple stock-flow methodology.

For the economic analysis, the methodology makes use of the national accounting framework of a country for the categorization of the effects.

The effects are described as damage (total or partial destruction of assets) and losses or the subsequent changes to the economic flows of income as a result of the disaster.

In keeping with the standard definitions in use, damage is defined as total or partial destruction of physical assets existing in the affected area. Damage occurs during and immediately after the disaster and is measured in physical units (i.e. square meters of housing, kilometres of roads, etc.). Its monetary value is expressed in terms of replacement costs according to prices prevailing just before the event.

Losses are defined as changes in economic flows arising from the disaster. They include loss of business due to cessation of work, increased costs of doing business and lost competitiveness leading to a reduced market share. Losses may be sustained for several years. Typical losses include the decline in output in productive sectors (agriculture, livestock, fisheries, industry and commerce).

The Human Development dimension of the effects of the disaster is the second key component of the methodology and seeks to make clear the effect of the event on the macro social variables of the country, found in its national

development plans and articulated in the MDGs and at the sub national levels. Essentially it makes clear the recovery needs of the population as a result of the event.

The third pillar of the PDNA is the identification of needs for Recovery and Reconstruction. This is presented in the Recovery and Reconstruction Framework.

The PDNA in this report assesses the impact of the floods and landslides, suggests a strategy for recovery and restoration of services, infrastructure, livelihoods and the economy, while militating against future flood damage. An important part of the PDNA is the identification of the financial implications of the recovery and reconstruction.

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## **X. MACROECONOMIC IMPACT**

### **2.1 Summary of Total Effect**

Given the nature and intensity of the Trough, it resulted mainly in damage to affected sectors, as losses were contained. The most heavily impacted sectors were infrastructure and agriculture. The damage to some infrastructure would most likely have reflected the cumulative impacts of Hurricane Tomas in 2010 along with the Trough event. This underscores the need for disaster risk mitigation strategies to take into account the cumulative impact of disasters on vulnerable states.

The total impact of the Trough was estimated at EC\$224.7 million or US\$83.2 million, the equivalent of 6.2% of GDP. Damage to physical assets and stocks amounted to EC\$198.1 million or 88% of the total, while losses (lost income and higher contingency costs) represented the remaining 12%. The infrastructure sector was most heavily affected with damage and losses estimated at over EC\$162 million (72% of the total impact). This does not include the cost of reconstruction, especially rebuilding to more resilient standards that would include a sizeable mark-up on costs, reflecting higher materials and labour costs. The fall-out in infrastructure stemmed from major damage and disruption of the transport networks, including roads and bridges (amounting to EC\$146 million). Damage in the transport sector would necessitate substantial works and spending for the rehabilitation of roads, bridges, culverts, river training; and slope stabilisation works to reduce the incidence of landslides.

Agriculture was the second most affected sector with impact estimated at around EC\$34 million. The sector suffered important crop damage and loss, loss of livestock and damage to farm equipment and feeder roads. This led to loss of income for affected farmers and short-term shortages of agricultural produce on the local market, resulting in higher prices.

The tourism sector was affected by flooding to hotels and other accommodation, with impact estimated at EC\$5.3 million. The sector suffered from loss of business owing to flight delays, cancellation of hotel bookings and lost sales for tour operators. Meanwhile, damage and losses in the manufacturing and distribution sectors were estimated at around EC\$5.0 million and over EC\$3.0 million, respectively. The impact on the manufacturing sector was estimated at EC\$3.2 million, stemming mainly from damage to plant and loss of stocks. The impact on distribution was contained at EC\$1.7 million, reflecting mainly loss of supplies.

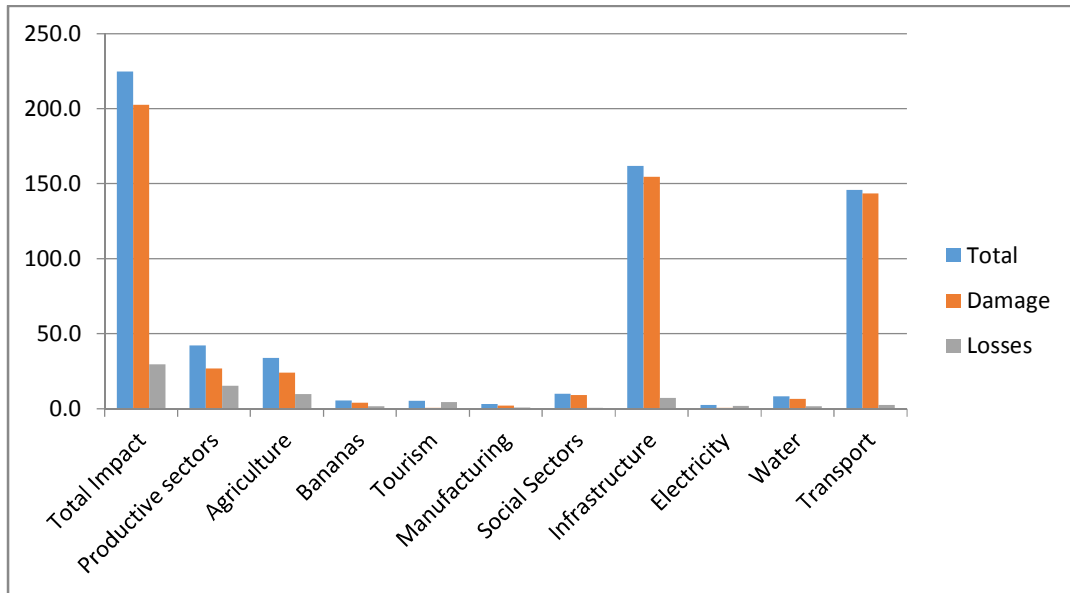
**Table 2 - Summary of Damage and Losses from the December Trough in Saint Lucia**

Sector and subsector	Total Impact US\$ millions	Damage and losses			% of Total Impact
		Total Impact			
		EC\$ M	Damage	Losses	
Exchange rate to US dollar	2.7				
<b>Total</b>	<b>83.2</b>	<b>224.7</b>	<b>198.1</b>	<b>26.6</b>	
<b>Productive sectors</b>	<b>15.6</b>	<b>42.2</b>	<b>26.7</b>	<b>15.4</b>	<b>18.8</b>
<b>Agriculture</b>	<b>12.5</b>	<b>33.7</b>	<b>23.9</b>	<b>9.8</b>	<b>15.0</b>
Banana/Plantains	2.1	5.6	3.9	1.7	2.5
Other Crops	1.3	3.5	3.0	0.6	1.6
Livestock	0.2	0.6	0.5	0.1	0.3
Fisheries	0.3	0.7	0.5	0.2	0.3
Farm infrastructure	7.6	20.6	14.2	6.4	9.2
Farm roads	0.9	2.4	1.8	0.6	1.1
Land loss		0.3	0.0	0.3	0.1
<b>Tourism</b>	<b>2.0</b>	<b>5.3</b>	<b>0.7</b>	<b>4.6</b>	<b>2.3</b>
Hotel subsector	1.3	3.5	0.0	3.4	1.6
Other subsectors	0.7	1.8	0.6	1.2	0.8
<b>Manufacturing</b>	<b>1.2</b>	<b>3.2</b>	<b>2.2</b>	<b>1.0</b>	
<b>Distribution</b>	<b>0.6</b>	<b>1.7</b>	<b>0.0</b>	<b>1.7</b>	<b>0.8</b>
<b>Social Sectors</b>	<b>3.7</b>	<b>9.9</b>	<b>9.1</b>	<b>0.8</b>	<b>4.4</b>
Housing	2.3	6.1	5.8	0.3	2.7
Health	0.3	0.9	0.6	0.3	0.4
Education	1.1	2.8	2.7	0.2	1.3
<b>Infrastructure</b>	<b>59.9</b>	<b>161.8</b>	<b>154.7</b>	<b>7.1</b>	<b>72.0</b>
<b>Electricity</b>	<b>0.9</b>	<b>2.5</b>	<b>0.6</b>	<b>2.0</b>	<b>1.1</b>
<b>Water (WASCO)</b>	<b>3.1</b>	<b>8.3</b>	<b>6.6</b>	<b>1.7</b>	<b>3.7</b>
<b>Transport Sector</b>	<b>54.0</b>	<b>145.9</b>	<b>143.4</b>	<b>2.5</b>	<b>64.9</b>
Reconstruction of Bridges	17.0	46.0	46.0		20.5
Construction of bridges	1.0	2.7	2.7		1.2
Construction of culverts/Crossings	2.6	7.0	7.0		3.1
River training works	11.7	31.7	31.7		14.1
Retraining Structures (walls)	0.1	0.2	0.2		0.1
Road reconstruction/repairs	0.1	0.2	0.2		0.1
Slope stabilisation	19.1	51.5	51.5		22.9
Miscellaneous repairs	1.5	4.1	4.1		1.8
Increased road transit time	0.0	0.0		0.0	0.0
Debris and silt clean-up	0.3	0.9		0.9	0.4
Landslide clean-up and disposal	0.6	1.6		1.6	0.7
Fallen tree removal	0.0	0.0		0.0	0.0
<b>Airport</b>	<b>1.0</b>	<b>2.7</b>	<b>2.5</b>	<b>0.2</b>	<b>1.2</b>
<b>Telecommunications</b>	<b>0.9</b>	<b>2.3</b>	<b>1.6</b>	<b>0.7</b>	<b>1.0</b>
<b>Environment</b>	<b>2.2</b>	<b>6.0</b>	<b>5.4</b>	<b>0.5</b>	<b>2.7</b>
Solid Waste	0.5	1.4	1.12	0.3	0.6
Water Resource Management Agency	0.1	0.3	0.3	0.0	0.1
Forestry	1.6	4.3	4.1	0.2	1.9

Source: ECLAC estimates, based on country data and information

**Figure 3 - Damage and Losses by Sector from the Trough in Saint Lucia**

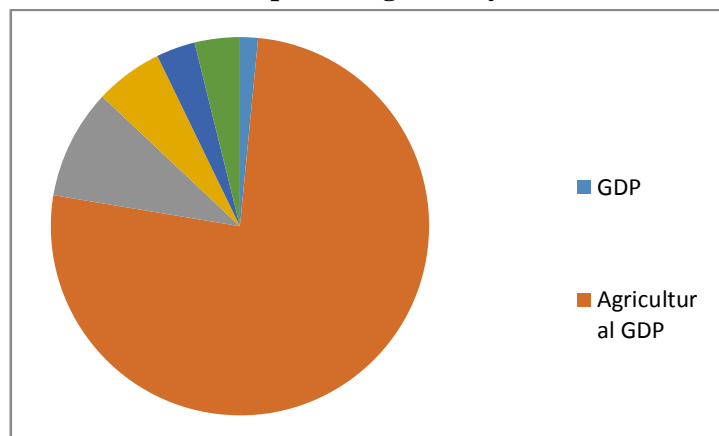




Source: ECLAC estimates, based on country data and information

The scale of the impact of the Trough can be gauged by the taking the total impact as a percentage of key macroeconomic variables (see chart below). The total impact was 6.2 percent of GDP, suggesting that the disaster was a moderate one in macroeconomic terms, although the infrastructure, environmental and social fall-out was severe. Indeed, the impact represented 39% of value added in the transport, storage and communication sector. Providing indication of the need to rebuild infrastructure and other capital assets, the total impact represented 26% of gross domestic investment and the impact on the infrastructure sector as a proportion of gross domestic investment was 18.7%. Total impact was 16.3% of exports of goods and services and 16% of public external debt.

**Figure 4**  
**Total Impact of the disaster as a percentage of Key macroeconomic indicators**



Source: ECLAC, based on estimates and national data supplied

## **2.2 Macroeconomic performance during 2013**

### **(a) Output and inflation**

The St. Lucian economy has been buffeted by the global crisis during the last few years. In 2013, despite some recovery in major markets, there was no positive spillover to the domestic economy, therefore growth declined by 2.3%, deepening the contraction in 2012. The downturn stemmed mainly from a sharp decline in construction activity (10.6%), owing to reduced private and public sector construction activity. Private construction was dampened by reduced foreign direct investment (FDI). FDI focused mainly on rehabilitation and expansion of a few hotel plants.

Manufacturing activity was also tepid, reflecting reduced local and regional demand. Value added in the sector contracted by 3.9% and was linked to reduced output of prefabricated metals, paper and other products. Overall the sector continues to face competitiveness challenges relating to small scale and high input costs, especially of energy and raw materials.

On the upside, tourism rebounded with growth of 5.7% in the hotel sector. High value added stay-over arrivals increased by 3.9% to 318,626, buoyed by growth in the US and Caribbean markets. Arrivals were positively impacted by expanded airlift from the United States. Similarly, lengths of stay and hotel occupancy also increased leading overall to a 10.3% growth in visitor expenditure to EC\$1712.7 million.

Agriculture registered growth of 0.3% despite higher input prices and the fall-out from the December Trough. The modest growth resulted from a sharp increase in production of other crops and a marginal increase in banana output. Banana continues to recover from the Black Sigatoka disease. However, exports were affected by quality concerns that led to the suspension of some farmers who failed to maintain required standards.

Average inflation moderated to 1.5% in 2013, compared with 4.2% in 2012. Inflationary pressures were dampened by lower prices of clothing and footwear, housing, water and electricity and recreation and culture. These offset higher costs of food and non-alcoholic beverages (5.0%) and household furnishings, equipment and maintenance (10.6%). These increases partly reflected the impact of the VAT.

#### **2.2.1 Fiscal Policy**

Fiscal policy is focused on structured consolidation to reduce deficit and debt levels, without stifling any impulses towards economic recovery. Central government's finances improved in 2013, with the overall deficit contracting by 5.3% to EC\$146.0 million, the equivalent of 5.4% of GDP. The outturn reflected growth in revenue that outweighed the increase in spending. Total revenue expanded by 5.3% to EC\$673.48 million, propelled by 10.4% increase in tax revenue that surpassed the decline (in nominal terms) in non-tax revenue. Tax receipts were boosted by VAT receipts following the introduction of the tax in 2012. This more than surpassed the contraction in receipts from taxes on international trade and transactions, partly reflecting lower import duty receipts on account of the reduced value of imports.

Total expenditure increased by 3.2% to EC\$819.5 million, fuelled by higher capital spending as current spending fell marginally. Capital expenditure expanded by 16% to EC\$200.2 million, propelled by spending on the rehabilitation and reconstruction of roads and bridges following Hurricane Tomas in 2010.

## **2.2.2 Monetary and exchange rate conditions**

Monetary developments were marked by a modest (1.9%) increase in domestic credit, similar growth in broad money and an expansion in the net foreign liability position of the banking system. Credit growth was driven mainly by demand by the central government to finance its fiscal deficit, as credit to the private sector declined marginally by 0.8%. Private sector credit was dampened by the decline in economic activity and weak investor sentiment.

The highlight of the distribution of credit by sector was the decline in credit to the productive sectors, which if sustained can dampen future growth. In the aftermath of the crisis, banks have tightened their lending practices with most lending being channeled to the personal sector and other services, with relatively shorter durations for repayment.

Broad money (M2) increased by 2.0% associated with a firm growth in savings deposits as time deposits contracted as households reduced their holdings of time deposits due to the fall in interest rates on these deposits. Liquidity in the banking system eased somewhat in 2013 as the reduction in loans surpassed the decline in deposits.

## **2.2.3 Balance of payments performance**

The current account deficit contracted substantially by over 32% (US\$ 95.3 million) to 11% of GDP in 2013 from 16.6% of GDP in 2012. The value of imports fell by 7.6% to US\$1, 675.1 million, associated with reduced imports of capital and consumer goods. The fall in imports of capital goods mainly reflected a decline in imports of machinery and transport equipment, while lower consumer goods imports was linked to reduced imports of miscellaneous manufactured articles, including furniture and clothing and footwear.

By contrast, exports contracted by 3.6%, reflecting a major fall-off in receipts from manufactured goods. Export receipts from beverages, food and other products declined as a result of lower regional demand stemming from increased competition.

The capital and financial account surplus narrowed to US\$89.3 million (6.7% of GDP), the lowest level in more than a decade and half. This development was primarily driven by a contraction of the surplus on the financial account. Net foreign direct investment declined by 3.4% in line with lower investments in construction activity, which just offset receipts from the sale of a local supermarket chain. The financial account was affected by substantial outflows on other investments reflecting government operations on the Regional Government Securities Market (RGSM) that offset large inflows (US\$42.0 million) in portfolio investment, including the foreign placement of government bonds.

## **2.3 The post-disaster macroeconomic performance**

### **2.3.1 Impact on GDP**

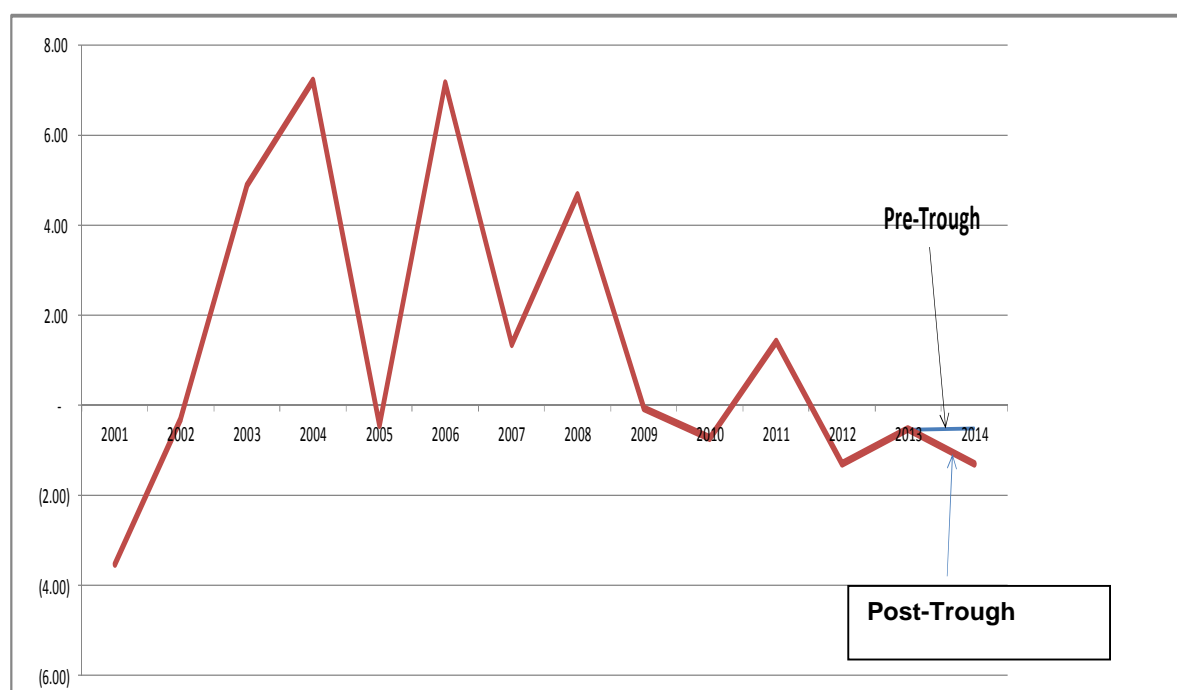
The Trough resulted mainly in damage to infrastructure, agriculture and other sectors. As losses from the event were contained, this has limited the impact on GDP. Therefore, the Trough is estimated to result in a decline of 0.3% in the projected GDP growth rate for 2014. The economy is now projected to contract by around 1.3% greater than the previously projected decline 0.5%. This indicates that the major contributor to the contraction in value added is not the Trough, but weak real output in key sectors, including construction, manufacturing and agriculture. In 2014, real output in construction is expected to decline by 7.4% maintaining the weakness from 2013. The tight fiscal situation and efforts at consolidation will result in weak public sector construction, while continued uncertainty surrounding growth prospects will dampen private construction.

Agriculture suffered the heaviest losses from the Trough, these stemmed from losses in the banana and plantain and other crops subsectors due to flooding, which has compounded other

problems such as the impact of the Black Sigatoka disease on the banana crop. These developments are expected to lead to a 2.3% fall in agricultural value added. The forestry sub-sector is projected to decline by 3.0% partly due to important environmental damage and losses, owing to the Trough.

Meanwhile, value added in manufacturing is projected to fall by 5.6%, mainly due to competition from regional producers, and losses from the Trough event. A number of manufacturers suffered heavy losses, including loss of stock, relative to the size of their establishments and would take some time to recover.

**Figure 5**  
**The Impact of the December Trough on GDP Growth in Saint Lucia**



Source: ECLAC based on National data

Value added in distribution is projected to decline by over 5% in line with sluggish domestic demand.

Real value added in the communication subsector is expected to fall by almost 4%, associated with weak activity, but also the effects of the Trough. This reflects losses in the communications subsector stemming from the Trough.

Tourism remains the bright spot in the economy and is projected to grow by around 4% in 2014. The high value added stay-over arrivals segment will maintain positive growth and visitor expenditure. Losses in tourism from the Trough were contained and are not expected to affect growth performance in the sector.

### **2.3.2 Prices, wages and employment**

Price developments in Saint Lucia, like its counterparts in the ECCB are strongly influenced by imported inflation from trading partners and supply and demand side developments in the domestic sectors. This is the case because the nominal anchor provided by the fixed exchange rate mutes inflationary pressures from the monetary side. The major impetus for higher inflation following the Trough has come from supply side shocks, particularly food shortages

in the domestic agriculture and livestock sector. This led to higher prices for bananas, root tubers and other crops that would have impacted inflation levels. The increase in imports of building materials, equipment and other products that would be necessary for the rehabilitation and reconstruction effort is also likely to transmit higher prices to the domestic economy leading to a moderately higher inflation. Nevertheless, any increase in inflation is expected to moderate in the short term.

### 2.3.3 Impact on Fiscal Operations

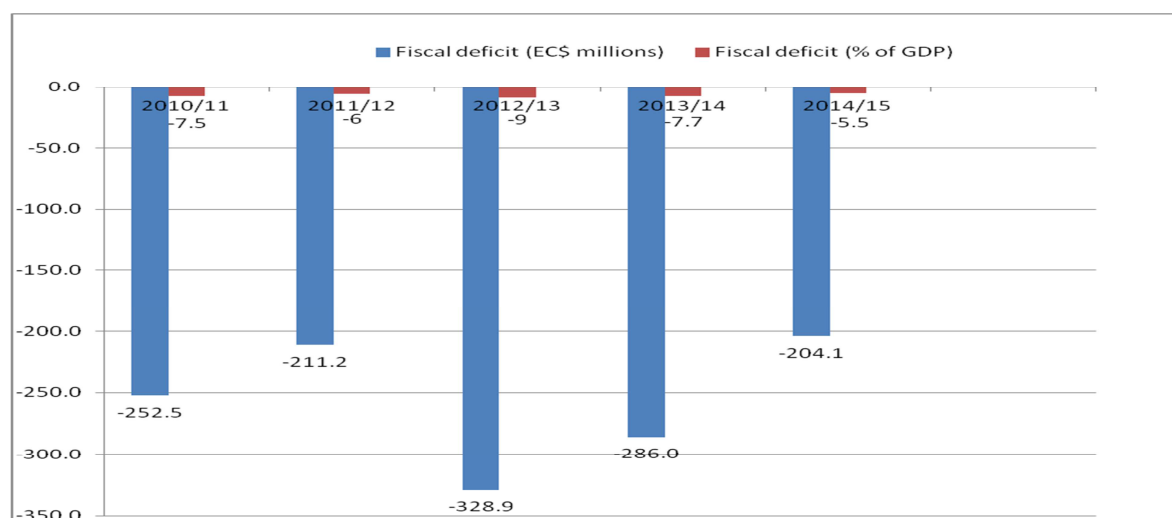
The impact of the Trough on the fiscal accounts in 2014 is expected to be ameliorated by two factors. The first is inflows of grant receipts and soft loan resources from the World Bank. The second is the tight fiscal situation, which provides limited space for government to take on additional loans. In addition, capacity constraints relating to procurement procedures, manpower, and technical resources mean that the reconstruction work will need to be phased over more than one year.

With these developments, the Trough is expected to have a very limited impact on government finances. As a result, government will be able to advance its fiscal consolidation programme. Therefore, the fiscal deficit is estimated to decline from 7.7% of GDP in FY2013/14 and to 5.5% of GDP in FY2014/15. Total revenues and grants is projected to decline by 0.7% to EC\$963.5 million, but will be outweighed by a 7% contraction in total expenditure. Revenues are expected to be dampened by reduced receipts from taxes on income and non-tax proceeds, the former reflecting the decline in economic growth. Meanwhile, VAT receipts are projected to increase, owing to improved VAT proceeds on domestic goods and services and on international trade. Similar to VAT revenues on international trade, taxes on international trade and transactions are also projected to expand in line with higher imports, partly for rehabilitation and reconstruction after the Trough.

Total expenditure is projected to actually contract by around 7% relative to 2013/14 led by reduced spending on wages and salaries and goods and services. Government has proposed a 5% cut in the wages and salaries of public servants as part of its expenditure reduction measures. There has also been a budgeted 13% decline in outlays on goods and services, reflecting a tightening of procurement and a focus on necessary goods and services.

**Figure 6 - The Impact of the Trough on the Fiscal Deficit in Saint Lucia**

Source: ECLAC estimates, based on country data and information



### 2.3.4 Monetary and exchange rate conditions

The loss of income by farmers, fisher-folk and tourism operators is expected to lead to temporary slowdown in growth in the money supply. However, this is only expected to last

for a short time, as firm growth in tourism and government spending should lead to a quick recovery in money supply growth. The demand for credit is expected to remain muted, owing to the decline in economic activity.

### 2.3.5 Impact on the balance of payments

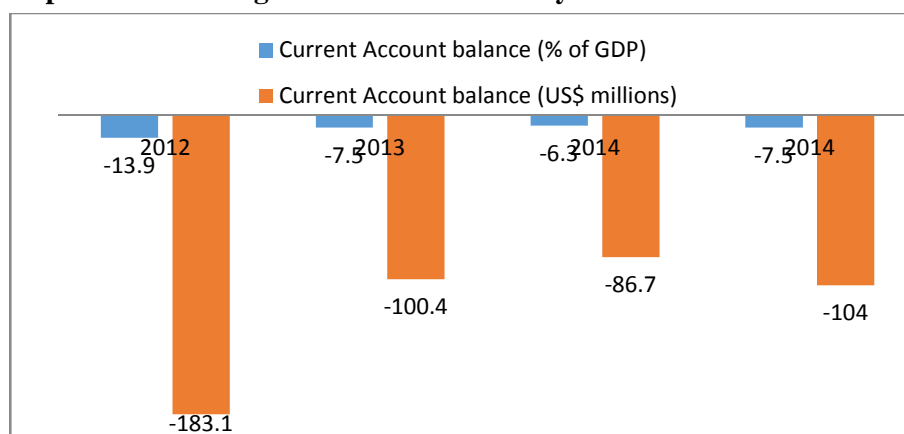
The Trough is expected to aggravate the imbalance in the external accounts. The structural balance of payments deficit is estimated to widen by 20% in (US\$17.3 million) to US\$104 million in 2014. This performance will be influenced mainly by an expanding merchandise deficit stemming from some growth in imports. Demand for imports will be bolstered by infrastructure and housing rehabilitation and reconstruction in the aftermath of the floods. This would lead to higher imports of building materials, equipment and fuel. Nevertheless, capacity constraints in implementing projects, owing to human and technical resources will constrain growth in imports to lower level than might have been possible.

Exports are expected to decline by about 4%, reflecting lower agricultural exports in line with damage to the sector. This will be manifested in reduced exports of bananas, plantains and root crops.

The services balance is expected to remain relatively stable as the disaster is not expected to affect travel receipts and payments for transport services is estimated to increase marginally. Firm growth in tourism for the year so far is expected to be maintained and to boost travel receipts for the year as a whole. The transfers account is estimated to improve owing to grant receipts for relief and recovery.

Figure 7

#### Impact of the Trough on the Balance of Payments Current Account Deficit



Source: ECLAC Estimates based on Official data

### 2.3.6 Recommendations economic recovery, reconstruction and resilience

The December Trough has again highlighted Saint Lucia's vulnerability to the cumulative effects of hazards. In this instance, reconstruction works after Hurricane Tomas will effectively merge into the reconstruction programme following the Trough. Given the possibility of shorter return periods for these types of hydrometeorological events, Saint Lucia needs to develop an integrated strategy for dealing with disaster risk mitigation and resilience building over the short to medium and longer-term.

From the standpoint of the macroeconomy, a key issue is the need to build a dynamic, competitive and productive economy that could generate the export receipts and fiscal savings to provide the buffers to facilitate recovery and reconstruction in the aftermath of disasters. This requires a clear focus on economic restructuring that is geared towards upgrading the

main sectors of the economy. The strategy should balance short-term recovery needs with longer-term adjustment. The starting point of this strategy is the revitalisation of key sectors of the economy.

In **agriculture** the short term focus should be returning production to pre-disaster levels. This requires targeted assistance, including planting material and also financial grants to replace lost or damaged equipment. In the longer-term a programme for the revitalisation of the agricultural sector is required. A key component of this should be a programme to increase productivity in the banana subsector, which is focused on maximising the output and quality of fair trade bananas for export to the EU market. In the other crops subsector, there is need for a better strategy to integrate three important elements. These are greater domestic use to reduce the food import bill, boosting demand by the tourism sector to strengthen the linkage between agricultural and tourism and improving shipping transport to trade surplus supplies with countries in the Leeward and Virgin Islands and Trinidad and Tobago. Stimulating increased demand by the tourism sector will require measures to improve the quality of produce and also the consistency and reliability of supply. This requires the application of better standards and quality management in the sector. To boost intra-regional trade in agricultural produce OECS governments need to examine how they can incentivize the private sector to provide more reliable shipping for this purpose.

Tourism suffered significant fall-out from the global crisis, but is now recovering. Nevertheless, the sector requires a clear competitiveness strategy to ensure its future success. The strategy should strive to integrate the supply and demand sides of the industry within a pricing structure that is based on value for money. With respect to the supply side operators and government need to focus strongly on product/service development. This requires the refurbishing and upgrading of hotel plant to enable them to command higher room rates. However, important attention should also be given to recreational and entertainment services, including natural and historical sites to increase their amenity value. This is critical to embedding tourism in the communities. Stronger linkages should be pursued with the creative industries with a focus on raising the skills of artists and the quality of handicraft that are available for purchase by tourists. On the demand side, existing strategies to increase airlift should be intensified and market diversification focused on Latin America and other emerging markets should be aggressively pursued.

On the social front, poverty reduction must be a key component of vulnerability reduction. The poor tend to settle in the most vulnerable areas, including flood plains and hillsides because they have few other options. Therefore, tackling poverty and indigence is central to strengthening the resilience of communities. This can be facilitated by instruments, including small grants and business training to enable the poor to enter in self-employment, improved provision of vocational and skills training facilities in poor communities and helping farmers get their produce to market.

It is recommended that government mainstream disaster risk reduction (DRR) and resilience building into its fiscal and debt programming. This is critical since a sustainable fiscal position provides some of the necessary financing for reconstruction after a disaster and similarly, adequate DRR helps to limit the impact of disasters on the budget and the economy as a whole. Indeed, it has been shown that a major contributor to spiralling debt in the OECS has been high reconstruction spending on rehabilitation and reconstruction after disasters. For instance, Saint Lucia's overall fiscal position before grants reversed from a surplus of EC\$4.7 million before Hurricane Dean in 2007 to a deficit of EC\$19.3 million in 2008 after Dean. Similarly, Saint Lucia's fiscal deficit increased substantially to EC\$196.6 million over a given period of time up to 2011, driven mainly by reconstruction spending following Hurricane Tomas.

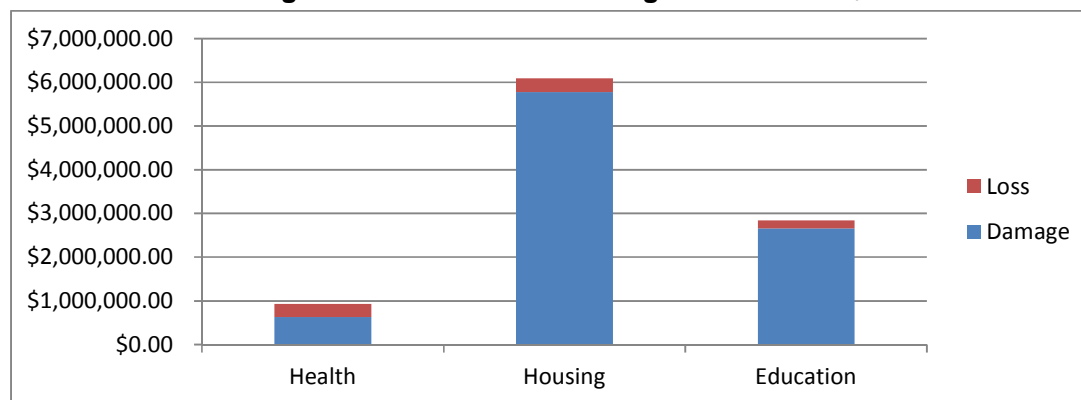
Financial resilience is also a key to reducing vulnerability to natural hazards. A critical aspect of this is increasing and widening insurance cover for disaster events in Saint Lucia. The government needs to strive within the constraints of resources to provide improved insurance cover for public properties to limit the burden on the budget and debt for repairs and reconstruction. In the short-term, this might be done by increasing cover under the Caribbean Catastrophic Risk Insurance Facility (CCRIF), to the extent that budget constraint allows this. However, in the longer-term, given the threat of climate change and the risk of more intense hazards, Saint Lucia or even the wider OECS needs to explore the possibility of a floating a disaster bond. This could serve the dual purpose of providing funding reconstruction after a disaster and also to provide better rates of return to domestic savers. In designing the bond certain key issues need to be carefully considered. In the first place the countries of coverage of the bond needs to be determined. In this case the wider OECS region might need to be considered to pool risks and reduce average administration costs. Second, a cap for the total value of the bond needs to be determined. As has been done in some developed markets, this could be informed by the value of total damage, losses and reconstruction costs from recent disasters divided by the affected population to give per capita impact. Thereafter, some modeling mechanism should be designed to price the bond. Finally, the government might need to provide a system for waiving taxes on interest earnings on the bond.

However, given the fairly high debt situation, the country would need to persuade investors to take up this offer, probably by offering an above market average rate of return. In addition, the shallowness of the financial market in the subregion could present a challenge to such a bond issue.

### 3.1 SOCIAL SECTOR

The social sector comprises the Housing, Health and Education sectors. These were heavily impacted, with resultant damage and losses estimated to be of the order of EC\$9,855,887. The highest incidence of damage occurred in the housing sector as the inundations affected most severely the lower income groups whose settlements and economic activity are located in areas prone to flooding. The severely affected areas as described in this report point to a high degree of correlation between poverty and exposure to risk. The health and education assets, almost completely Government-owned, while suffering some damage, benefited to a greater extent from land use and asset location plans.

**Figure 8 - Social Sector damage and losses - \$EC**



Source: Mission estimates

#### 3.1.1 Housing Sector

The Housing Sector sustained the highest losses, totalling \$313,040.00 or 39.69% of all losses, while Education accounted for the lowest losses 23.25% or \$185,000.00. The



Housing Sector accounted for the highest damage, and the Health sector for the lowest, with \$5,772,500.00 (63.67%) and \$635,899.00 (7.01%) respectively.

The data provided by the Ministry of Housing was useful in providing data on the number of houses destroyed or damaged, whether severely or partially. This was as follows:

**Table 3**  
**Housing damage per primary affected district**

<b>Location/District</b>	<b># of Houses Affected</b>	<b>Percentage (%)</b>
Vieux-Fort North	5	12.5
Anse La Raye	5	12.5
Canaries	6	15
Laborie	3	7.5
Marc- Bexon	13	32.5
Bexon Highway	8	20
<b>Total</b>	<b>40</b>	<b>100</b>

Seven (7) houses were completely destroyed throughout the island; this has resulted in eleven (11) persons being made homeless. The houses which were completely destroyed were predominantly wooden structures with most of the destruction being primarily caused by flooding and one as a result of land slippage.

The incidence of damage was exacerbated by the location of the damaged houses, invariably in a river bed or on the banks of the river. Houses located on higher land suffered less damage as slope failure and landslides did not occur pervasively. Some 89% of the damaged houses were purely residential, while 5% were commercial and another 5% were a combination of residential and small cottage enterprises. The estimated cost of the damage to the 40 houses reported on by the Ministry of Housing was of the order of EC\$ 700,813 with a valuation based on replacement cost. The evaluation team conducted field visits and on that basis was able to estimate damage island-wide at much more than the forty houses reported on. The estimate is that some 740 houses were damaged. An average replacement cost of household appliances was estimated at EC\$6000 per house. The methodology used for making the estimate was perhaps the same as that employed by the predecessor team that conducted a study and made an estimate of damage and losses in January 2014. The present team was in agreement with the methodology and the estimate of loss of household items for the 740 affected houses as estimated as being close to the figure of EC\$ 445,8000. The assessment team therefore adopted many of the estimates of the former mission team with small modifications to reflect perhaps more accurately the lower calculated loss estimate that it arrived at. The lower cleanup cost is attributed to the opportunity cost on the part of the homeowners who cleaned up for themselves in the majority of cases. The opportunity cost is calculated on the basis of the earnings that they would have made if they did not have to engage in the clean-up. Given the estimated relatively low daily rate of earnings of these homeowners, the average cleanup cost per house was estimated to be of the order of EC\$500 per house. Table 3 below is a presentation of the table produced by members of the World Bank team with modifications. The present table omits the relocation project in deference to its being addressed under the section of the report that addresses reconstruction.

**Table 4: Damage and Loss to the Housing Sector**  
**\$EC**

Description	Damages EC\$	Losses EC\$	Damage Plus Losses	Import content of Damage
Housing destroyed (7 units)	935,000		935000	561,000
Housing damaged (33 units)	379,500		379500	227,700
Loss of household goods (743 units)	4,458,000		4458000	2,674,800
Cost of demolition		\$220,000.00	220000	
Lost rental income		\$11,040.00	11040	
Cleanup and debris removal		\$280,000.00	280000	
<b>Total</b>	<b>\$5,772,500</b>	<b>\$313,040</b>	<b>6085540</b>	<b>3,463,500</b>

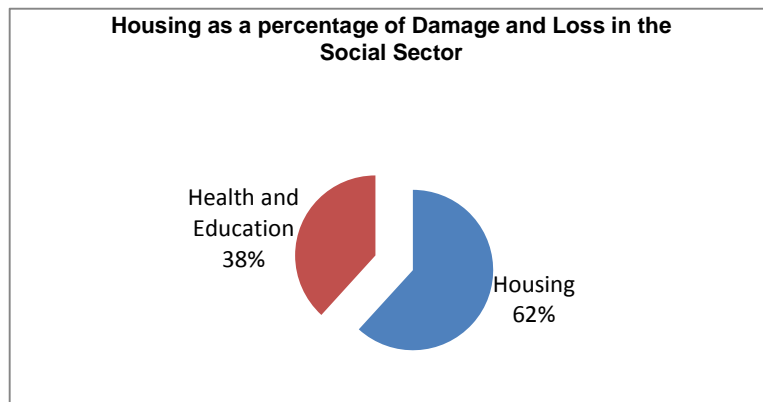
Source: World Bank report, with mission modifications

The housing sector suffered the largest impact, accruing at \$6,085,540.00 in damages and losses, accounting for 62% of the total damages and losses in the social sectors.

A total of 40 homes were lost and damaged with the largest amount (13) coming from the Marc/Bexon area. Seven (7) houses were completely destroyed. These were predominantly wooden structures, and the damage was due to flooding as a consequence of land slippage. The incidence of damage was exacerbated by the location of the damaged houses, invariably in a river bed or on the banks of rivers that had become silt and rock filled. Houses located on higher land suffered less damage as slope failure and landslides did not occur pervasively.

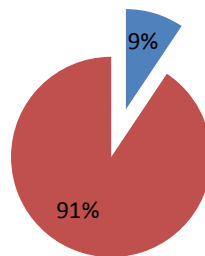
Some 89% of the damaged buildings were purely residential, while 5% were commercial and another 5% were a combination of residential and small cottage enterprises.

Figure 9



**Figure 10**  
**Health as a percentage of Damage and Loss in the Social Sector**

■ Health ■ Housing & Education



### 3.1.2 Health Sector

The Ministry of Health operates 33 district health centres/clinics, 1 polyclinic, 4 hospitals, and 1 mental health facility. In addition, there is one (1) private hospital. While this sector showed the lowest impact, nonetheless the health facilities suffered significant loss of supplies and equipment due to flooding, and functioning was interrupted because of the lack of water and electricity. The Victoria Hospital, Saint Lucia National Mental Wellness Centre, Community Nursing, Gros Islet Polyclinic and St. Jude Hospital were damaged or significantly affected; as a result, the delivery of services was temporarily impacted by interruptions in electric power, water supply and concerns for the security of personnel.

The medical facilities at Anse La Raye and Canaries were the most heavily impacted, leading to the closure of those facilities for up to two weeks. Examination of the health centre at Anse La Raye led to the decision that a new facility should be built with all of the flood mitigation features included in the design. Combined, these two facilities serve a population of approximately 3,700, and so as to ensure that the members of the community had access to need health care, service was provided through the Primary Health Care department of the Ministry of Health. The Department of Public Health provided water purification tablets in the aftermath of the event to prevent the spread of any water borne diseases. There has been no direct adverse health impact on the society as a result of this intervention.

**Table 5 - Damage and Loss to Health Sector \$EC**

ITEM	DAMAGE	LOSS	DAMAGE PLUS LOSS	IMPORT CONTENT OF DAMAGE/LOSS***
<b>Equipment:</b>				
Saint Lucia National Mental Wellness	7139		7139	4997.3
Primary Health Care	86995		86995	60896.5
Environmental Health	215000		215000	150500
Health Information Services	6655		6655	4658.5
St. Jude Hospital	177263		177263	124084.1
Dental & Specialty Equipment	142847		142847	99992.9
<b>SUB-TOTAL</b>	<b>635899</b>			

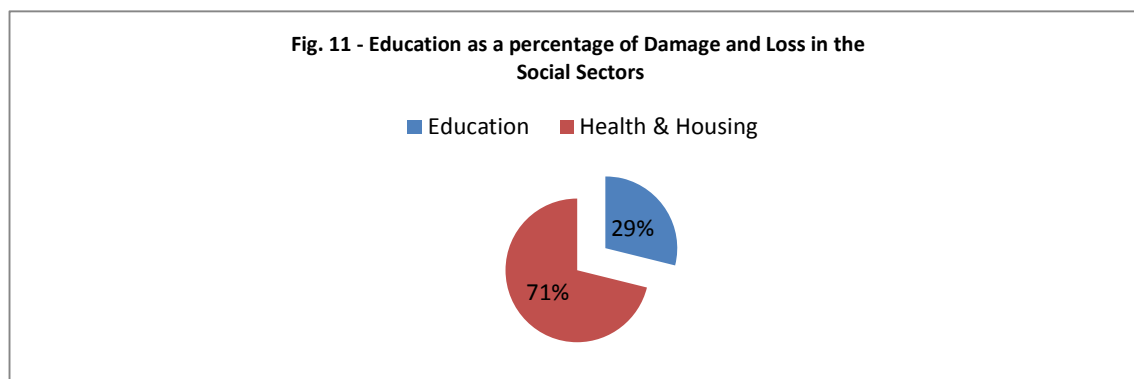
Medical Supplies		259505	259505	259505
Rain Water Harvesting		80709	80709	
Repairs to Canaries Health Centre		68000	68000	47600
Anse la Raye Health Centre**		757000	757000	529900
Clean Up for Facilities		29000	29000	0
Water tanks in Canaries		2250	2250	2250
SUB-TOTAL		<b>1196464</b>	<b>1832363</b>	1284384.3
GRAND TOTAL			<b>1832363</b>	<b>1284384.3</b>
*** Assumption that 70 percent of materials will be imported				

Source: Government data communications

### 3.1.3 Education Sector

The education system comprises Early Childhood Education Centres totalling approximately 130, 80 primary and/or infant schools, 24 secondary schools, 1 tertiary level institution, and 6 special needs/education centres. Of these some 8 institutions at the primary and secondary levels are private institutions run by the Seventh Day Adventist (SDA) church and other organisations. Nonetheless, all are governed by the work of the Ministry of Education.

The estimate of total damage and loss to this sector was \$2,843,693.00, accounting for 29%



of all damage and loss in the social sector.

Six facilities were heavily impacted. The Anse La Raye Primary School Annex was completely destroyed, and a school in Canaries has been earmarked for total reconstruction.

Since most schools have classes at the ground level, all schools across the country needed to be closed for a few extra days to complete the clean-up and the ensure that low-lying power outlets were neither adversely affect nor rendered harmful to the students.

One school in the flood-prone Bexon area has now moved all classes from the ground floor. In addition, the school has implemented a disaster prevention measure by moving all supplies and other perishable items to the higher floors during the school holidays, thus reducing their losses significantly. Further, at the level of the Ministry, plans are being formulated to institute works that will effectively prevent flooding on the ground level of the schools at risk for flooding.

Table 6  
Damage and Losses in the Education Sector (EC \$)

SCHOOLS	DAMAGE	LOSSES	TOTAL DAMAGE PLUS LOSSES	IMPORT CONTENT OF DAMAGE
Canaries Infant	759900	50000	809908	455940
Canaries Primary	315193	30000	345193	189115.8
Anse La Raye Primary	425000	30000	345000	255000
Vieux Fort Primary	68200	30000	98200	40920
Vieux Fort Campus	180000	-	180000	108000
Dame Pearlette Louisy Primary	18400	30000	48400	11040
Bexon Primary	202000	15000	217000	121200
Castries Comprehensive	400000	-	400000	240000
Corinth Secondary	100000	-	100000	60000
Piaye Secondary	60000	-	60000	36000
George Charles Secondary	60000	-	60000	36000
Micoud Secondary	30000	-	30000	18000
Forestiere Primary	20000	-	20000	12000
Soufriere Comprehensive	20000	-	20000	12000
<b>TOTAL</b>	<b>2658693</b>	<b>185000</b>	<b>2733701</b>	<b>1595215.8</b>

The above table was built using data supplied by the Ministry of Education which confirmed the list as providing data on all of the schools impacted by the rains of 24 December 2013.

Source: Data provided

#### 4.1 Agriculture

**This section has been reproduced from the report of the World Bank team that preceded the second mission to Saint Lucia.**

**Background.** While contributing to only 3.9 percent of GDP<sup>4</sup>, agriculture is nevertheless a critical sector, employing approximately 11 percent of the total working population<sup>5</sup>. Saint Lucia is a net food importing country, with a trade deficit in its food imports growing over the last 10 years. Despite its contraction over recent years, banana production remains central to the sector, occupying 48 percent of the cultivated land and accounting for 41.4 percent of gross agricultural output. Other important crops include coconut, cocoa, vegetables and herbs, other fruit and tree crops and cut flowers. Saint Lucia takes advantage of the deep bays and inlets around the island to promote marine and aquatic production through the fisheries industry. Despite only contributing US\$6.74 million (EC\$18.06 million) to the country's GDP, fishing is the third largest agricultural sector and provides livelihoods for many small farmers<sup>6</sup>. Although the livestock sector is small and dominated by the poultry and pork sub-sectors, it continues to experience some growth.

**Impact of the Disaster.** The agriculture sector was impacted by the flooding, landslides and the interruption of transport services. Physical damages to agriculture include loss of crops and livestock and damages and losses to the fisheries sector which is largely artisanal. Damages to infrastructure accounts for impacts to irrigation and drainage systems, farm

<sup>4</sup> World Bank, 2012 Estimate

<sup>5</sup> Saint Lucia Annual Statistical Digest, 2011

<sup>6</sup> Saint Lucia Annual Statistical Digest, 2011

infrastructure as well as loss of market access due to damages to rural roads, bridges and river banks.

The amount of land impacted was estimated at 1,376 acres (5.6 sq.km, around 5 percent of the total agriculture land area in country), and 286 farmers were directly affected with production, stock and equipment suffering significant physical damage. The most vulnerable populations in SLU engage in agricultural employment, thereby increasing the severity of the impacts.

In response to a request from the GoSL, the Food and Agriculture Organization (FAO) assisted the Ministry of Agriculture (MoA), with the preparation of a detailed loss and damage assessment. Agriculture sector impacts are summarized in the following excerpts from that report:

- The **crop sub-sector** was severely impacted, especially the banana, plantains, vegetables and root crops industries
- While the total number of farmers in the **livestock sub-sector** was less, some farmers lost all their livestock, while sustaining significant damage to production facilities and infrastructure.
- Select damages were experienced in the **fisheries sub-sector** (e.g. fishing gear and engines), with minor damage reported to fish landing sites. Some 80 percent of all aquaculture ponds suffered varying degrees of damage, mainly due to siltation and loss of tilapia and shrimp. Siltation problems were evident on sea-moss farms. The marine environment (e.g. coral reefs) will continue to be affected by high turbidity for many months to come due to high levels of siltation in the river channels.
- **Irrigation:** Extensive damage to irrigation infrastructure, including damage to pumps, due to siltation and overland flooding was evident.
- **Drainage:** Heavy siltation of the lower valley areas, including farm drainage system was evident.
- **Farms and Feeder Roads:** Extensive damage and siltation to farm and feeder roads have restricted access.
- **River Banks:** Extensive riverbank erosion was evident in some areas.
- The **forestry sub-sector** reported damages to forest areas, forest infrastructure, ecotourism facilities, river banks and water intakes of varying degrees.
- **Valley lands:** Heavy deposition of sand on land adjacent to main river channels resulted in change in soil type. A large volume of debris and stones was also deposited on adjacent lands.

Forestry. Damages in this subsector are variously reported resulting from flood and landslide and include damages to, forest infrastructure, tourism sites (trails, visitor centers etc.) and associated damages affecting watershed resources. While largely managed by the Forestry Department, the Water Resources Management Agency (WRMA) is also involved in the forestry subsector through its work in maintaining a system of rain gauges and stream flow gauges. While there is a need to improve the capacity of this network by adding instrumentation in strategic locations, direct damages from the loss of field stations is estimated at US\$200,000 (EC\$530,000).

**Financial.** Total damages in the agricultural sector are estimated to be **US\$5.2 million** (EC\$13.94 million). Total losses are estimated to be **US\$7.7million** (EC\$20.69 million). The estimated total in losses and damages is **US\$12.9 million** (EC\$34.63 million). This amount represents approximately 27 percent of the total GDP contribution from the agriculture sector

posing a significant exogenous shock directly impacting 11 percent of the nationally employed population who depend on this sector for direct employment. A summary of associated damages and losses above-described is included below.

**Table 7**  
**Damage and Loss in the Agriculture Sector**

ITEMS	US\$	EC\$
<b>TOTAL EFFECT</b>	<b>\$12,721,640.75</b>	<b>\$ 33,712,348</b>
<b>TOTAL DAMAGE</b>	<b>\$9,006,474</b>	<b>\$23,867,157</b>
<b>IMMEDIATE EMERGENCY RESPONSE (0 – 3 MONTHS)</b>	<b>\$5,006,167.92</b>	<b>\$13,266,345</b>
• Banana/Plantains	\$1,453,886	\$3,852,800
• OtherCrops	\$1,114,411	2,953,190
• Livestock	\$195,509	518100
• Fisheries	\$203,869	540,255
• FarmInfrastructure – tools and equipment, off farmirrigation	\$461,509	1,223,000
• Farm Infrastructure – Drainage main drains	\$1,611,924	4,271,600
• FarmRoads	\$34,943	92,600
• ImmediateEmergencyRequirements	\$5,006,167	13,266,345
<b>IMMEDIATE EMERGENCY REHABILITATION RESPONSE ( 0 – 3 months)</b>	<b>\$4,000,306.42</b>	<b>\$10,600,812</b>
• FarmInfrastructure – onfarmirrigation/drainage/office	\$3,401,287	9,013,412
• FarmRoads	\$599,018	1,587,400
• LandLoss		-
<b>LIVELIHOODS RESPONSE – 3 – 6 MONTHS</b>		
<b>TOTAL LOSSES</b>	<b>\$3,715,166</b>	<b>9,845,191</b>
• Banana/Plantains	\$654,249	1,733,760
• OtherCrops	\$222,881	590,635
• Livestock	\$46,194	122,415
• Fisheries	\$57,456	152,260
• FarmInfrastructure	\$2,407,177	6,379,020
• FarmRoads	\$226,453	600,101
• LandLoss	\$100,754	267,000

\*Adapted from: REVISED AGRICULTURAL SECTOR ASSESSMENT OF THE DAMAGE AND LOSSES CAUSED BY LOW-LEVEL TROUGH WEATHER SYSTEM, January 31, 2014, Ministry of Agriculture with assistance of FAO

## 5.1 Tourism Sector

The 2009 Tourism Satellite Account prepared for Saint Lucia reveals that 64% of Saint Lucia's economic output is either directly or indirectly attributable to tourism. The core (direct only) tourism sector contributes approximately 30% to Saint Lucia's GDP, making it the top ranked sector in the economy. The table below shows tourism indicators since 2009.

**Table 8**  
**Tourism Indicators**

	2013	2012	2011	2010	2009
Stay-over Arrivals	318,626	306,801	312,404	305,937	278,491
Yacht Arrivals	40,891	42,173	41,730	42,750	31,997
Cruise ship visitors	594,118	571,894	630,444	670,043	699,306
Tourism expenditures (EC\$ mln)	1,734 <sup>e</sup>	1,576	1,554	1,500	1,122

Number of rooms	4,865	4,845	4,845	4,685	4,641
Occupancy rate (%)		57	58	58	53
Ave. length of stay (days)	8.9	8.7	8.9	8.6	8.9

Source: Saint Lucia Tourist Board. E=estimate

In 2013 the tourism sector showed an increase of 3.9 percent for both tourist and cruise ship visitor arrivals. With a drop in yachting tourist arrivals of 3 percent, total arrivals increased by 3.6 percent. This growth was accompanied by an estimated increase in tourist expenditures of 10 percent. This was driven by a strong increase in demand from the USA and to a lesser extent by an increase in Caribbean demand.

### Post disaster

Most of the tourism facilities are located in the Northern part of the island and were not directly affected by the low level through. In addition, the lodging facilities in those areas that were affected by the flooding, reported minimal damage to assets. In contrast attractions did suffer damage as shown in table 9 below.

Three sites were impacted significantly, the Latille Falls in Micoud; the Toraille Waterfall in Soufriere and Fond Latissab. In addition, several sites managed by the Soufriere Regional Development Foundation (SRDF) were affected. Furthermore, sedimentation of the marine environment affected diving, particularly from Anse la Raye to Gros Piton. Financial losses, in terms of lost sales, for dive operators, are estimated at EC\$ 89,100. Total damage, as shown in table 9 below, amounts to EC\$ 622,500 and this with losses at EC\$ 209,201 resulted in a total effect of EC\$ 831,701.

**Table 9**  
**Impact on attraction sites (EC\$)**

	Damage	Losses	Total Effect
Latille Falls	100,000	33,000	133,000
Toraille Waterfall	250,000	73,101	323,101
Fond Latisab	60,000	3,000	63,000
Soufriere Regional Development Foundation	212,500	11,000	223,500
Diving	0	89,100	89,100
Total Attractions	622,500	209,201	831,701

Source: Ministry of Tourism and SRDF

The impact on the tourism sector took the form of lost revenues from tours, delayed flights, cancellations and the additional expense for the purchase of water. The Ministry of Tourism and the St. Hotel and Tourist Association conducted a limited survey among hoteliers. Fourteen hotels, representing 1624 rooms, responded. The following emerged:

- The cost of trucking of water ranged from zero to well over EC\$ 250,000 and averaged EC\$ 293 per room.
- The loss of revenue due to cancellations showed also a wide variation from zero to well over EC\$ 270,000, and averaged EC\$ 493 per room
- Damage to hotels was negligible.

There were no responses to queries on any additional costs items. Hence, these losses must have been very small.

Flights delays caused some losses as tourists arrived one or two days later than scheduled and similar delays were experienced by on island tourists who could not leave. The net impact is estimated at a loss of EC\$ 170,890.

The passage of the through did not cause any cancellation of cruise ship calls. However, disembarkation of cruise ship visitors and crew was not possible on 25 December and, until



the end of the year, there was also a decline in tours. These factors resulted in total losses of EC\$ 465,071. There was a similar decline in tours by stay-over tourists which amounted to a loss of EC\$ 318,118.

**Table 10 - Summary Impact on Tourism - (EC\$)**

Tourism Summary Table			
	Damage	Losses	Total Effect
Attractions	622,500	209,201	831,701
Hotel sector	36,334	3,447,452	3,483,786
Cruise ship visitors	0	465,071	465,071
Other tours	0	318,118	318,118
Flight delays	0	170,890	170,890
Total tourism	658,834	4,401,531	5,060,366

Source: Mission estimates

### Recovery and Reconstruction

Despite the passage of the low level through in December 2013, tourist and cruise ship arrivals in December 2013 and January 2014 showed robust growth with stay-overs growing at 6.9 and 6.7 percent and cruise ship visitors at 9 and 6.5 percent respectively. This growth assisted in a rapid recovery of the industry.

While damage to the industry at EC\$ 622,500 was limited the sector remains vulnerable to future disasters and climate change. The reconstruction aspect, summarized in table xyz below, aims to reduce this vulnerability as indicated in table 11 below. The sector does have an operational disaster response plan which focuses on the immediate safety of tourists and staff. This plan could be strengthened to incorporate a section that would focus on recovery and reconstruction.

The tourism industry has experienced several times water shortages over the last decade and with each event has become more vulnerable to interruptions in the water supply. Each occasion has involved the high cost of trucking water and the cancellations by prospective visitors. It is recommended that the St Lucia Hotel and Tourism Association initiates a discussion with WASCO to provide storage facilities in interruption-prone areas and on a property water conservation and storage programme, which would also be consistent with the current and proposed climate change adaptation strategies.

Group insurance might be one instrument to increase the resilience of the tourism industry while reducing the cost of insurance for individual (small) establishments. It is recommended that the Saint Lucia Hotel and Tourism Association in conjunction with HERITAS and other heritage sites in Saint Lucia explores the feasibility of instituting a programme of group insurance for the tourism sector.

**Table 11 - Reconstruction needs for the tourism sector (EC\$)**

Repair of damage	684,750	Damage plus 10% for building back better
Strengthening tourism disaster response plan	150,000	
Water conservation and storage programme	250,000	In conjunction with WASCO
Group Insurance	250,000	Initial exploration
Total	1,334,756	

Source: Mission estimates

## 6.1 Manufacturing

The manufacturing sector accounted for a little over 3.3 percent contribution to the national economy according to projected Gross Domestic Product estimates for 2013.

In the Castries and Bexon areas, business establishments were impacted by the flood event, especially in the areas of Cul de Sac and Bexon. Investigations revealed that a number of medium to large industries lost inventory, physical infrastructure as well as business opportunity resulting from the temporary cessation of business due to the closure of these establishments. A report from the Ministry of Commerce, Business Development, Investment and Consumer Affairs indicates damages sustained by 12 establishments of EC\$1.9 million. Based on impressions gained from field visits, cottage industries may have sustained damage to capital stock of E\$250,000. A conservative mission estimate puts losses sustained at EC\$42,000 for these 12 establishments for cleanup activities. The incidence of insurance coverage of these establishments is about 42% and even in the case of those establishments that had insurance, the amount of the deductible discouraged claims against the insurance companies. The import content of the damage figures took into consideration the fact of a small national manufacturing capability and a conservative estimate of an import content of 75% for most capital items.

Information provided by a previous mission indicates that approximately 113 small and micro enterprises were affected, principally by interruptions in the water supply and limitations in transportation. The losses resulting from these interruptions have conservatively been estimated at EC\$850,931.

Total Damage and Losses to the Manufacturing Sector have been estimated to be EC\$ 3,190,131.

**Table 12**  
**Damage and Losses in the Manufacturing Sector**

Description	Damage EC\$	Losses EC\$	Total Damage and Loss EC\$	Import content EC\$
<b>Manufacturing Sector</b>				
Equipment and Inventory – medium and large establishments	1,947,200		1,947,200	1460400
Equipment and Inventory –small and micro establishments	250,000		250,000	187500
Cleanup costs		42,000	42,000	
Business losses – medium and large establishments		850,931	850,931	
Business losses – small and micro establishments		100,000	100,000	
<b>TOTAL</b>	<b>2197200</b>	<b>2,722,931</b>	<b>3,190,131</b>	<b>1647900</b>

Source: Mission estimates

## 7.1 Commerce

The contribution to GDP of the Distribution Sector was almost twice that of the Manufacturing Sector, recording some 6.8 % of 2013 projected GDP.

For Distribution, the lack of information provided no basis for the calculation of a robust estimate for damage. Business losses were estimated on the basis of gross margin per day derived from the national accounts estimates. Considering the time of the year and the seasonality of purchases, it is possible that the loss of sales for an average period of 5 days would have amounted to loss of sales for 2 days.

**Table 13**  
**Damage and Loss in the Distribution Sector - \$EC**

Description	Damage EC\$	Losses EC\$	Total Damage and Loss EC\$	Import content EC\$
<b>Wholesale and Retail Sector</b>				
Business losses			1,730,054	
TOTAL		1,730,054	1,730,054	

Source: Data supplied and mission estimates

## 8.1 Infrastructure

### 8.1.1 Transport

#### *Sub-Sector Background*

The island of St Lucia is covered by a relatively dense network of roads that is to some extent constrained by its geography. In addition to a leeward highway that links Gros Islet in the north to Vieux Fort in the south, there is also a windward highway linking Vieux Fort to Dennery. The road turns inland at Dennery, traversing across the Barre De L'Isle Ridge, through Bexon and over to Cul-de-Sac. North of Dennery, there is another cross-island road network, through Grande Riviere down to Marisule Estate. In the southern part of the island,

the secondary road network is constrained by the geography and these roads radiate inland away from the coast.

As is to be expected, the main highways and the secondary roads occasionally cross rivers that drain the mountainous inland areas out to the coast. For all of these crossings, the roadways are maintained either by bridges or culverts.

Risk exposure to natural hazards for these structures typically comes in the form of extreme rainfall and/or river flooding events that threaten to wipe out roads, bridges and culverts. For the most part, there does not appear to be a clear consensus on what should be appropriate design criteria for these river crossing and/or flood water conveyance structures. This is an issue that will



require some attention in the face of climate change impacts with the increasing potential for extreme rainfall events.

### The Effects of the Event

The effects of the December vent are summarised below:

- For the damaged road in the vicinity of Micoud on the south-east coast (Helen Road, Canelles), the culverts were washed out and are to be replaced with a 3m (h) x 3.5m (w) concrete box culvert, or by a new bridge. It is estimated that the culvert is able to convey the 1-in-50 year return period flood flows. The cost of repairs has been estimated by MIPST at EC\$2.5m, however this includes a component of rebuilding to a higher standard than previously existed, in order to reduce vulnerability to future flooding events.
- It was noted that Norbert Road provided access for a significant amount of people who were trying to leave Castries. This indicates that this road may be used as an emergency evacuation route in the future in the event of future flooding.
- It was also noted that the Ministry needs to achieve clarity on the application of design criteria for waterway crossings, rivers and roads.
- The comment was made that a proper maintenance programme for bridges and waterway structures needs to be implemented.
- The Water Resources Management Agency operates river stage gauges, which if properly configured, may act as Early Warning Systems (EWS) to alert communities at risk about potential upcoming danger from flooding.
- In this regard, and with respect to the second-to-last point, there is an EWS connected to a stream gauge attached to the bridge at Corinth. It is to be

noted. However, that this gauge has malfunctioned and up to the time of preparation of the present report had not been repaired.



The diagram below shows the locations of the major bridge washout sites from this event (in red). In addition, sites where river training is needed are also shown (in orange). What can be clearly seen is that the damage was linked to the rivers and waterways that radiate out from the central mountainous areas.

In addition to the sites shown on this figure, damage occurring to the road network included:

- Landslide
- Failed gabion baskets and/or other river training works
- Undermined and/or damaged road pavement
- Collapsed wingwalls at bridges
- Culverts washed away

- Bridges washed away
- Collapsed retaining walls
- Collapsed foot bridge
- Collapsed drains

Losses included *inter alia*:

- Clearing away of silt and debris
- Installation of Bailey Bridges

1. Grand Riviere – Thomazo
  2. Micoud – Canelles
  3. Joyeux
  4. Piaye
  5. Canaries
  - A. Bexon
  6. Anse Marc Marc
  - B. La Raye
  - C. Canaries
- Bridge/Culvert Repairs and/or Reconstruction
- River Training Works

Some photographs of the damage are shown on the following pages.

3  
○



Road Break at Canelles (profile)

Road Break at Canelles



Road north of Vieux Fort (looking south)

Road north of Vieux Fort (looking south)



In general, the December 24th event had catastrophic impacts on the road infrastructure of St Lucia, and particularly in the southern two-thirds of the island. The rainfall intensity that occurred was thought to be close to a 1 in 100 year event, which led to flash flooding and debris flows, and which ultimately caused the destruction of many waterway structures.

#### *The Way Forward - Recovery*

In many cases where infrastructure damage occurred, the Ministry of Infrastructure, Port Services and Transport has committed to rebuilding. In some instances, Bailey Bridges are being used as temporary structures until proper replacement structures may be implemented. One of the primary issues to be dealt with includes the adoption of appropriate design criteria, taking into account the potential for climate change and the occurrence of more extreme rainfall events. In addition, it is critical that bridge and culvert designs account for the occurrence of debris coming down from the mountainous sections of the catchment, as these often result in debris jams followed by re-routing of the river paths and subsequent loss of roadways, bridges, and adjacent infrastructure.

The recommendation is made that all bridge designs on the main highways be done to accommodate a minimum 1 in 100 year return period event. For smaller bridges and culverts in the interior, this criterion could be relaxed to the 1 in 25 year event.

## XI. SUMMARY OF DAMAGE, LOSS AND RECOVERY

The following tables summarise the damage, loss and recovery/reconstruction estimates for this sector.

**Table 14 (a)**  
**Estimates of damage and loss in Infrastructure**

Transport Sector - DAMAGE	ESTIMATED AMOUNT (EC\$)	Sub-Total Summary (EC\$)
<b>Reconstruction of Bridges</b>		<b>45,960,000</b>
Grand Riviere (2 bridges)	18,960,000	
Tomazo	5,500,000	
Piaye	5,000,000	
Canaries	5,700,000	
All Zones	10,800,000	
<b>Construction of Bridges</b>		<b>2,700,000</b>
Canelles - Micoud (Helen Main Road)	2,700,000	
<b>Construction of Culverts/Crossings</b>		<b>7,000,000</b>
Joyeaux	6,000,000	
Volet	1,000,000	
<b>River Training Works, River Bank Protection and River Dredging</b>		<b>31,660,000</b>
Anse La Raye	2,610,000	
Canaries	2,350,000	
Marc/Bexon	26,700,000	
<b>Retaining Structures (Wals, etc.)</b>		<b>229,500</b>
Anse la Verdue	4,500	
Venus	225,000	
<b>Road Reconstruction/Repairs</b>		<b>206,000</b>
Sarrot/Vannard	200,000	
Canaries	6,000	
<b>Slope Stabilization</b>		<b>51,535,000</b>
Anse La Raye to Venus Road	13,400,000	
Belair Hill	135,000	
All zones	38,000,000	
<b>Misc. Repairs</b>	<b>4,120,308</b>	<b>4,120,308</b>
<b>TOTAL</b>	<b>143,410,808</b>	<b>143,410,808</b>

Source: Mission estimates

<b>Transport Sector - LOSS</b>	<b>ESTIMATED AMOUNT (EC\$)</b>
Increased Road Transit Time	11,936
Silt Clean-Up	330,363
Debris Clean-Up	91,450
Debris and Silt Clean-Up	477,108
Landslide Clean-Up and Disposal	1,585,063
Fallen Tree Removal	1,000
<b>TOTAL</b>	<b>2,496,920</b>

Source: Mission estimates

**Table 14(b)**  
**Estimates of damage and loss in Infrastructure**

<b>Transport Sector -RECOVERY AND RECONSTRUCTION</b>	<b>ESTIMATED AMOUNT (EC\$)</b>
<b>Pre-Engineering Investigations</b>	
Geotechnical investigations	2,000,000
Hydrologic/Hydraulic	1,000,000
<b>Engineering Design Investigations</b>	4,841,000
<b>Construction Supervision</b>	10,503,000
<b>Working with Informal Agricultural Sector</b>	10,000
<b>TOTAL</b>	<b>18,354,000.00</b>

<b>TOTAL DAMAGE + LOSS + RECOVERY AND RECONSTRUCTION</b>	<b>164,261,728</b>
<b>TOTAL DAMAGE + LOSS</b>	<b>145,907,728</b>

Source: Mission estimates



## 8.1.2

## Communications

### Sub-Sector Background

There are two primary telecommunications providers in St Lucia, Lime and Digicel. Of the two, Lime supplies land line, mobile and internet services, whereas Digicel provides mobile services only. As a result of this difference, the equipment requirements of the two providers are different. On one hand, Digicel uses mostly cell tower equipment for transmission, whereas Lime uses telephone poles for land lines, cell towers for mobile equipment and fibre-optic cable for digital data transmission. In many cases, the fibre optic cables are attached to bridges that span rivers.

### Mechanism of Damage from the Event for this Sub-Sector

Two distinct modes of damage were experienced for this sub-sector. First, for the provision for cellular services, lightning strikes created the most damage to equipment. Second, for the provision of land line, cable and internet services, damage occurred primarily through the washing out of fibre optic and copper cables that were attached to these bridges.

### Impacts of the Event – Damage and Loss

#### **Digicel**

The team noted the following:

- Damage occurred primarily from lightning strikes, even though the cell tower sites typically have lightning poles to deflect the strikes. The lightning storm started at around 3:00PM and continued until approximately 11:00PM on Christmas Eve. It was noted that this was one of the most intense lightning storms that had ever been experienced in St Lucia.
- The site that experienced the most problem was at Piaye, where access was made very difficult by virtue of the fact that the bridge had been washed out. Digicel therefore had to resort to the use of a boat to get the repair crews into this area.
- With the hub site at Piaye down, the related dependent sites were also down, although fortunately for this provider, the system never went into a complete shutdown mode.
- The estimated cost of damage was US\$25,000.
- It is estimated that there may have been a small loss in revenue in the area, although a review of its accounts that was done by this telecoms provider did not reveal any substantial loss.
- Digicel did however note a definite drop-off in recharge amounts in 2014.
- Clean up crews cost Digicel an estimated EC\$75,000 – 80,000.

#### **Lime**

During this meeting it was indicated that:

- In general, the fibre optics network is run underground, and the conduits are attached to bridges where rivers are to be crossed. Because of this, at those river crossings where bridges were washed out, the fibre optic network cables were also lost. Losses to cable were experienced at Piaye, Mon Repos, Thomazo Bridge, Canelles Bridge and Canelles Road, for example.
- Lime also suffered damage from lightning strikes to cell sites, cell equipment and electronic equipment.

- In addition to damage to the fibre optic network, there was also damage to copper infrastructure, which is used for the distribution of telephony, DSL and cable services in the various areas.
- The clearing away of debris from site areas was carried out by the Ministry of Works.
- It is to be noted that Lime has a Managed Services Agreement with Ericsson, who was actually the entity that did the repairs of equipment for Lime.
- Damage to the network was estimated at US\$500,000 (materials only).
- Fortunately for Lime, 80% of the equipment required for repairs was available from their existing stores. As can be expected however, there was a need to reorder supplies so as to replenish these stores.
- It was also noted that since Lime continues to implement repairs, the damage estimate quoted above could increase by as much as 15%.
- For its corporate customers (hotels, corporate entities), Lime had to give large rebates, totalling approximately EC\$150,000.
- For its pre-paid customers, the rebate was approximately US\$50,000.
- Loss of revenue for this utility was estimated at US\$30,000 per day, and they were down for between 2 and 4 days. All systems were back up after about 5 days. It is noted also that people who do business for example with the tourism sector, and who do credit card transactions, would have lost revenues as a result of the inability of the machines to function during this period.
- Lime would also have lost some roaming charges. On average, revenues from roaming services total approximately US\$140,000 per month. As an offset for this loss however, there was a significant increase in the number of calls coming in, as people attempted to check on the status of their relatives.

#### The Way Forward – Recovery

##### **Digicel**

After Hurricane Thomas, Digicel diversified its fuel storage arrangements to have three storage sites island wide, instead of one in the north as had prevailed previously. In this regard therefore, no changes for future improvement are planned. Further, Digicel keeps contracting crews on retainer, so that they can react to emergencies on demand. This arrangement has helped the utility to keep on top of management of emergencies in times of natural disasters.

##### **Lime**

No specific improvements are planned that would seek to reduce vulnerability of this utility, with the exception of the stockpiling of stores and spare materials. This action is seen to be critical, as it has the potential to significantly reduce the recovery time for the utility following a natural disaster.

#### Summary of Damage, Loss and Recovery/Reconstruction

The following tables summarise the damage, loss and recovery/reconstruction estimates for this sector.

**Table 15**

**Damage, loss and recovery/reconstruction estimates - Telecommunications**

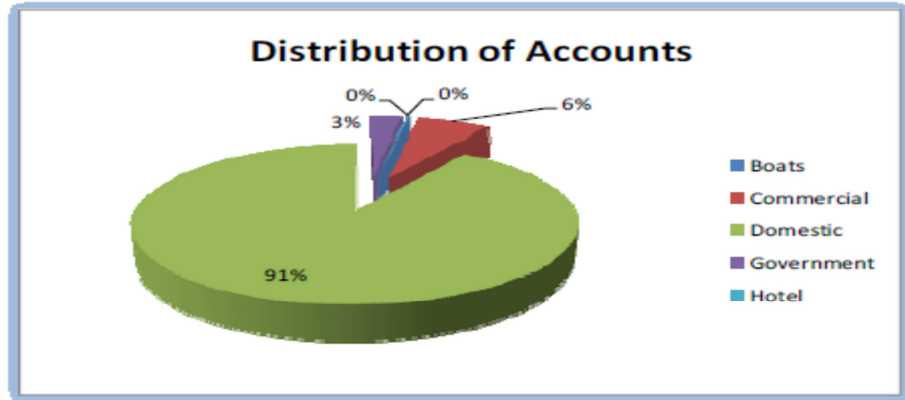
<b>Digicel DAMAGE</b>	<b>Rehabilitation Cost (EC\$)</b>	<b>Notes</b>
Damage to hub site at Piaye and to dependent sites	66,750	
<b>Lime DAMAGE</b>		
Loss of fibre optic cable on 5 bridges		Material costs
Damage to copper cable infrastructure	1,535,250	Material costs
<b>TOTAL DAMAGE</b>	<b>1,602,000</b>	
<b>Digicel LOSS</b>	<b>Estimated (EC\$)</b>	<b>Notes</b>
Charges by repair contractors for fixing site	80,000	
<b>Lime LOSS</b>		
Rebates to corporate customers and hotels	150,000	
Rebates to pre-paid customers	133,500	
Loss of revenue	320,400	first 3 days at full loss of revenue, last 2 days at 50% loss of revenue
Loss of Roaming Charges	62,300	Based on a typical roaming revenue of US\$140,000 per month
<b>TOTAL LOSS</b>	<b>746,200</b>	
<b>TELECOMMS RECOVERY AND RECONSTRUCTION</b>		
<b>Lime</b>	<b>Estimated (EC\$)</b>	<b>Notes</b>
Replenishment of stores of fibre optic and copper cables	1,068,000	
<b>TOTAL</b>	<b>1,068,000.00</b>	
<b>TOTAL DAMAGE + LOSS + RECOVERY/RECONSTRUCTION</b>		<b>3,416,200.00</b>
<b>TOTAL DAMAGE + LOSS</b>		<b>2,348,200.00</b>

**8.1.3 Water and Sanitation**

*Sub-Sector Background*

The collection, treatment and distribution of water in Saint Lucia are handled by the Water & Sewerage Company Inc. (WASCO), which is a private company formed under the Companies Act of St Lucia, and having 100% shareholding by the Government of St Lucia. Company revenues are generated from its customer base by monthly billing. In general, the billing of accounts by WASCO is done on the basis of user categories, an approach which gives some insight into the customer base for this utility. Categories include: boats; commercial users; domestic users; government offices and agencies; and hotels. In total, there are in excess of 45,000 water supply accounts and 3,700 sewerage accounts. The breakdown by category is displayed in the following diagram, with boats attributing 0.1% and hotels 0.2%, respectively (note that these are both shown as 0% in the figure below).

**Fig. 12 – Distribution of Accounts – Water and Sanitation**



Source: WASCO's data



In St Lucia, potable water is collected at raw water intake structures located along/within rivers (see image to the left), and the collected raw water is then piped to treatment plants, following which it is distributed to the various user groups in PVC, HDPE or ductile iron piping. The distribution system uses a combination of gravity and pumped flows. Typically the distribution pipes are initially run along the banks of rivers, buried at the side of roads, or are often strapped to bridges where waterways are to be crossed.

Where river crossings occur, and the pipes are actually placed in the rivers, they are typically encased in concrete. Some attempts at vulnerability reduction have been made by WASCO, such as at Anse la Raye, where increased resilience has been built into the system since the passage of Hurricane Thomas. This was achieved by virtue of the fact that the water mains pipe was taken out of the river itself and buried under the bank. Because of this, the damage to this section of the distribution system was not as extensive as had occurred during Thomas.

Mechanism of Damage from the Event for this Sub-Sector

In many cases, the water collection, treatment and distribution systems failed as a result of:

- Intakes being clogged and/or destroyed;
- Pipes being washed out of river beds;
- River banks being eroded with the consequence that the structural supports for the pipes were washed out, leading to collapse of the pipes into the rivers and their subsequent failure;
- Loss of pipe mains strapped to bridges when the bridges themselves were washed out; and



Water main strapped to bridge deck

- Loss of pipe mains resulting from destruction of roadway in which they may have been encased.



Water main broken by road

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## **XII. IMPACTS OF THE EVENT – DAMAGE AND LOSS**

The following observations have been made:

- The same (or similar) failure modes as occurred in Hurricane Thomas were observed for this trough event.
- There was significant damage to several of the raw water lines carrying water from river intakes to treatment plants.
- There was also damage to the intake structures, from tree debris, high water levels and major siltation.
- The damage observed was island-wide.

- At 9:00 PM on the night of the 24<sup>th</sup> December 2013, the Utility Services Manager made the recommendation to shut down the raw water intakes, in an attempt to protect the treatment facilities.
- Following the event, and during the recovery period, WASCO went on a rotating system of water lock-offs in an attempt to get water to all consumers in as equitable a manner as possible.
- The pumps and pump house equipment at Beausejour were lost in the event.
- The point was made that between Hurricane Thomas and this last event, the John Compton Dam has lost approximately half of its storage capacity. It is rated at a design capacity of 3 million gallons, however as a result of sedimentation resulting from the two mentioned events, its capacity has been reduced to approximately by one-half to approximately 1.5 million gallons. This loss in capacity is due exclusively to siltation from rivers entering the dam and from landslides along the banks of the dam.
- The water supply accounts at WASCO generate gross revenues of approximately EC\$4.7 million per month. It was noted that the net monthly revenues are approximately 90% of this total.
- As a result of the rainfall event on the 24<sup>th</sup> December 2013, the utility shut down on Christmas Day. The following recovery schedule was subsequently achieved:
  - ✓ Soufriere was restored by the end of the 25<sup>th</sup>
  - ✓ Hill 20 came back on stream by the 26<sup>th</sup>
  - ✓ Dennerly was back on stream by the 27<sup>th</sup>
  - ✓ By the 29<sup>th</sup> the main trunk lines in the north were up to 90% capacity
  - ✓ By the 4<sup>th</sup> January, Vieux Fort was back on stream
  - ✓ Micoud was restored by 10<sup>th</sup> January
- During the recovery period, water was trucked to consumers. This aspect was handled by NEMO at a total cost to WASCO of EC\$78,000.

#### The Way Forward - Recovery

In general WASCO experiences a lack of funding that would prevent the company from implementing all of the desired vulnerability reduction and resilience enhancement approaches in one attempt. Recognising this reality, WASCO management has decided to approach the problem from the viewpoint of implementing small modular projects that will be designed to fit within a larger Master Plan. The most vulnerable areas that have been identified include:

- a) Micoud
- b) Delcer
- c) Canaries
- d) Vanard

As an example, at Micoud there is a known susceptibility to landslides and the long-term plan there calls for the relocation of pipelines away from the danger zones. Other mitigation strategies include:

- Replacement of PVC pipe with HDPE, which is a more flexible type of piping. At Micoud the implementation of this plan will see the replacement of

approximately 10,000 feet of 6 inch diameter PVC pipe with HDPE of a similar diameter. At Delcer, over 300 feet of 10 inch diameter pipe is presently in the riverbed and will need to be replaced. At Canaries, over 400 feet of 6 inch diameter pipeline is to be replaced. At Vanard, over 6,000 feet of 24 inch diameter pipeline is to be replaced.

In addition, any enhancement works should fit within a larger Rural Plan for all of these villages. For example, knowledge of planned community improvement projects, such as river training works, new bridges, improved sanitation, etc., will be necessary inputs to the design of new water supply mains that are to be constructed and maintained in a sustainable manner.

Finally, the John Compton Dam should be dredged in order to restore its storage capacity if even in a phased manner. This work may be carried out using suitable dredging equipment in the dam. The image below shows a cutter-suction dredge working to de-silt a reservoir in Central America. Note that in this case the cutter head mechanism is raised out of the water and the discharge line goes over the sides of the dam.

Even though the volumes of material that can be moved by such dredging equipment is relatively small, by working in a continuous manner over a number of years, a significant amount of material may be moved. There are a number of ways in which the sediments may be extracted from the dam, including flushing through water extraction valves, syphoning over the spillway of the dam and pumping to a decanting area for subsequent removal. It is important to ensure that the dredging equipment is properly maintained, which will require the appropriate training of technical maintenance staff and the stockpiling of critical spare parts for the machinery.



It is recommended that a minimum of 500,000m<sup>3</sup> of silt should be dredged in the near-term so as to restore the dam's water storage to two-thirds of its design capacity. This strategy is considered to be one that will ensure water supply security for the island, in the face of climate change and the threat of extended periods of drought. The material removed will have to be placed initially in a silt holding pond, where it would be allowed to dry out, and then transported to a final disposal site. The dredging of the remaining 1,000,000m<sup>3</sup> that is required to be removed, so as to restore the dam to its full design capacity, could then be carried out over a phased period of years, in order to keep the costs manageable.

The dredging of silt material from the dam may be accomplished in at least two ways:

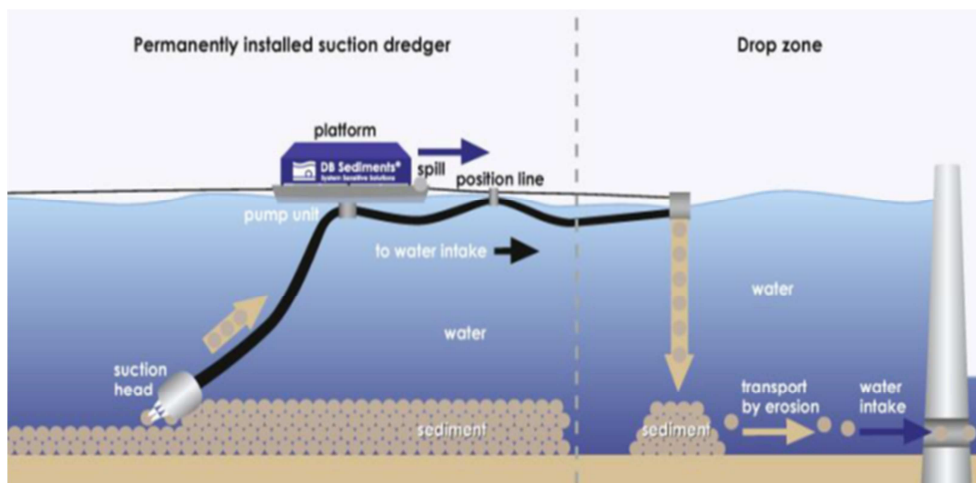
- a) The Government of St Lucia could enter into a contract with a dredging contractor to carry out the work. In this option, the Contractor would be paid at an agreed unit rate for the material removed. This unit rate would have to be negotiated to cover dredging, decanting and disposal of dredge material. The volumes dredged would have to be confirmed by surveys; or
- b) The Government of St Lucia could purchase a suitable dredge such as the one shown in the photograph below (cutter-suction). It would then have to hire staff (2 x two-man crew plus a supervisor) to operate and maintain the equipment on a full time basis. Typically, the dredge production rate for dredges like this range from 150 – 300 yd<sup>3</sup> per hour and the dredge operates typically for a minimum of 16 hours per day. Based on this production rate, the required amount of material could be dredged in a 5 or 6-month period. This second approach is potentially less expensive than the first, however it is much more capital intensive. It does however have the advantage that the equipment would be owned by the utility and could be used on an ongoing basis to de-silt the dam.





### Ellicott Series 370 "DRAGON™" Dredge

A detailed feasibility study of proposed sediment management strategies for the John Compton Dam was completed in June 2013 by DB Sediments and funded by the German aid agency, the GIZ. In this report, the authors recommend the adoption of a Continuous Sediment Transfer method. The diagram below taken from their report shows the mechanism recommended. The recommended method calls for the dredging of sediments and their subsequent placement proximal to the water intake/outlet valve location, where the sediments can be flushed downriver.



Summary of Damage, Loss and Recovery/Reconstruction

The following tables summarise the damage, loss and recovery/reconstruction estimates for this sector.

**Table 16**  
**Damage, loss and recovery/reconstruction estimates**

<b>WASCO DAMAGE</b>	
<b>Item</b>	<b>Estimated Cost (EC\$)</b>
Damage to raw water lines at Delcer, Canaries, Vannerd	2,471,000
Damage to intake structures	
Damage to distribution lines crossing rivers	3,100,000
Destroyed pump and pump house at BeauseJour	1,000,000
<b>TOTAL</b>	<b>6,571,000</b>

<b>WASCO LOSS</b>	
<b>Item</b>	<b>Estimated Cost (EC\$)</b>
Loss of revenue from utility shut down and phased reopening	1,645,000.00
Trucking of water by NEMO	78,000.00
<b>TOTAL</b>	<b>1,723,000.00</b>

<b>WASCO RECOVERY AND RECONSTRUCTION</b>		
<b>Item</b>	<b>Estimated Cost (EC\$)</b>	<b>Notes</b>
Relocation of pipelines away from most vulnerable zones	3,604,500	3 km of pipeline to be replaced using HDPE pipe
Cleaning of catchment in areas of intake structures; creation of micro-dams	900,000	To be done by Forestry Department
De-silting of John Compton Dam	80,100,000	500,000 m3 dredged at a rate of US\$60.cu.m - Restores capacity to 2.0 million cu.m of possible 3.0m
<b>TOTAL</b>	<b>84,604,500.00</b>	

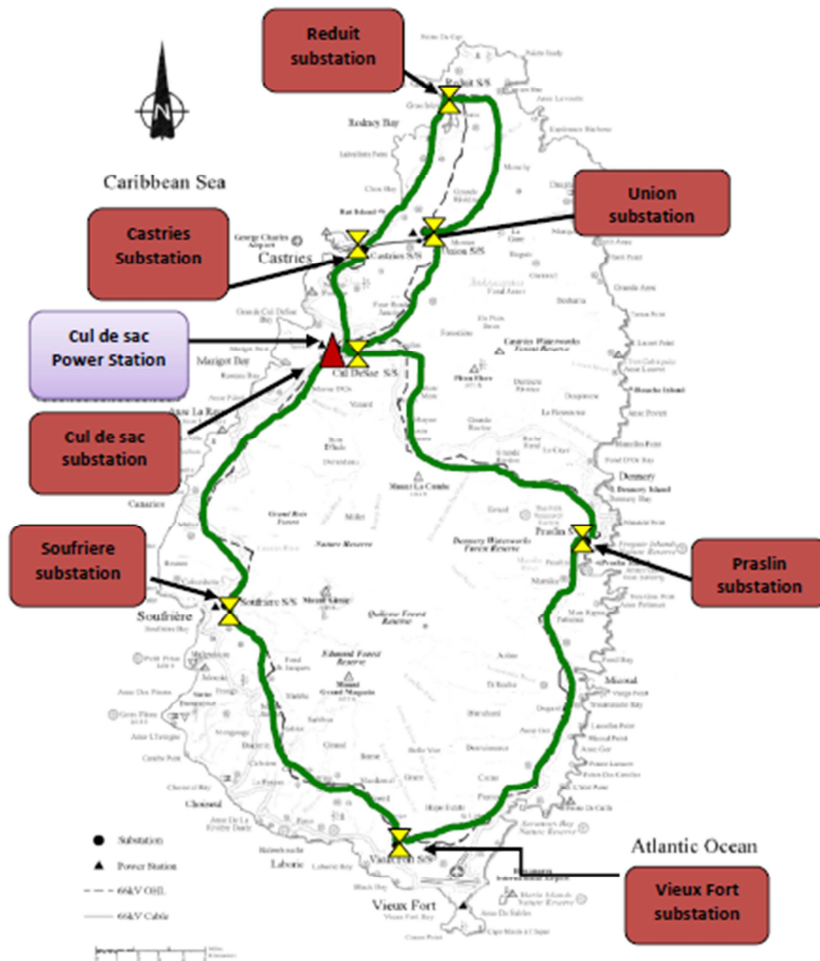
<b>TOTAL DAMAGE + LOSS + RECOVERY AND RECONSTRUCTION</b>	<b>92,898,500.00</b>
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<b>TOTAL DAMAGE + LOSS</b>	<b>8,294,000.00</b>
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#### 8.1.4 Electricity generation

Sub-Sector Background

The St Lucia Electricity Services Ltd. (LUCELEC) is a publicly traded utility that delivers electricity to its customer base in St Lucia. In 2012, the company sold 333 million kWh of electricity, with corresponding total revenues of EC\$341.8 million. Planned improvements to the generation of energy include the incorporation of geothermal energy as well as Waste-to-Energy based on agricultural and municipal wastes. The distribution network used by LUCELEC is shown in the figure following. The main generating power station at Cul-de-Sac is shown, along with the other sub-stations. Seventy-five (75%) percent of the utility's customer base is served by the north ring.



*Mechanism of Damage from the Event for this Sub-Sector*

The primary mechanism for damage to this utility was from flooding of the Union Sub-Station in the north. The plant is beside the Choc River. As a result of that flooding, the sub-station was out of commission for approximately three (3) days. It is, however, notable that by reconfiguring the power distribution mapping of the grid so as to draw from other generating sources, LUCELEC was able to restore power within two hours to those customers who would normally have been served by the Union sub-station.

*Impacts of the Event – Damage and Loss*

The team noted the following:

- The primary impact of the rainfall event was experienced at Union, where that sub-station had to be taken off-line as a result of flooding.
- In the south, a number of electricity poles were brought down by landslides.
- To a large extent, access to damaged infrastructure was a problem. For example, the bridge at Piaye was washed out and service crews had difficulty accessing points south of that.
- Virtually the entire customer base had power restored by the 25<sup>th</sup>, with the exception of a few people only. Cost of damages was estimated at \$300,000.

- Soufriere would have been the last station to come back on stream at around 9:30PM on the night of the 24<sup>th</sup> December 2014. This sub-station supplies between 5% and 10% of the customer base.

The Way Forward - Recovery

This is the third time in the recent past that the Union Sub-Station has been subjected to flooding. As a result of this, LUCELEC has devised immediate, medium and long-term vulnerability reduction plans. These are described as:

- Tier 1 – Use of an Early Warning System (EWS) for monitoring the upstream water levels in the Choc River. The first alarm from this EWS would lead to a configuration of critical elements, and the second alarm would trigger shutdown of the sub-station.
- Tier 2 – This is a medium-term plan that would require raising the elevation of the sub-station and/or constructing a bund wall around it to act as a dyke.
- Tier 3 – Is the long-term plan that would call for the relocation of the sub-station to a less vulnerable location.

Summary of Damage, Loss and Recovery/Reconstruction

The following tables summarise the damage, loss and recovery estimates for this sector.

**Table 17**

**Damage, loss and recovery estimates - Electricity**

<b>LUCELEC DAMAGE</b>	
<b>Item</b>	<b>Rehabilitation Cost (EC\$)</b>
Flooding of Union sub-station	300,000
Poles taken down by landslides in the south, e.g. Piaye	250,000
<b>TOTAL</b>	<b>550,000</b>

<b>LUCELEC LOSS</b>	
<b>Item</b>	<b>Estimated (EC\$)</b>
Loss of revenue from damaged stations	1,972,222.22
<b>TOTAL</b>	<b>1,972,222.22</b>

<b>LUCELEC RECOVERY AND RECONSTRUCTION</b>	
<b>Item</b>	<b>Estimated (EC\$)</b>
Tier 1 - Early Warning System for Union	100,000
Tier 2 - Raising Union Station or installing a dyke	2,000,000
Tier 3 - Relocation of Sub-station from Union	10,000,000
<b>TOTAL</b>	<b>12,100,000.00</b>

<b>TOTAL DAMAGE + LOSS + RECOVERY AND RECONSTRUCTION</b>	<b>14,622,222.22</b>
<b>TOTAL DAMAGE + LOSS</b>	<b>2,522,222.22</b>

Source: Mission estimates

### 8.1.5 Airports and Seaports

#### Sub-Sector Background

All ports in St Lucia (whether air or sea) are managed by the Saint Lucia Air and Sea Ports Authority (SLASPA). The island has two airports, the George F. L. Charles Airport in the north at Castries, and Hewanorra International Airport in the south at Vieux Fort. The former airport handles primarily regional traffic, with typically the largest aircraft landing and taking off being Dash-8 and ATR. The latter airport by comparison functions as a fully international terminal, which receives both regional (jet), North American and trans-Atlantic traffic.

SLASPA also oversees the operation of two seaport facilities, one at Castries and the other at Vieux Fort. At Castries, there is a six-berth cargo facility on the south side of the harbour, and cruise berthing facilities within a purpose built Duty-Free terminal at Pointe Seraphine, on the north side of the harbour. In addition, there are two adjacent cruise berths that handle vessels of up to 1000 ft. in length. At Vieux Fort (Port Vieux Fort) the equipment includes a 500 ft. long finger berth as well as a 690 ft. Lo-Lo container berth.



**Airport and Seaport at Castries**



## **Airport and Seaport at Vieux Fort**

### *Mechanism of Damage from the Event for this Sub-Sector*

The river flow in the La Tourney River swelled to extreme levels and the river overflowed its banks in two primary locations that are shown in the Google earth© image following. The first was at a bridge upstream (i.e. north) of the airport where the water went over the bridge and flowed in a sheet overland, across an old US Base airstrip and into the terminal, carrying with it a significant amount of debris. It is reported that a wave of water came into the terminal, with a height of approximately 3 ft. Users of the terminal at the time who saw the water approaching had to move rapidly upstairs to avoid being soaked. Once that wave of water had gone through, there was about 3 inches of standing water that remained on the terminal floor. These events were recorded to have taken place at around 8:40 PM on Christmas Eve.

The second location where the river overflowed was at a bend where the river has been diverted to flow around the runway. In this case the water flowed across the runway, carrying debris and subsequently causing the chain link perimeter fencing to be bent over and/or destroyed. Effectively, the collection of debris trapped against the fencing caused the fencing to present a solid barrier to the flowing water, which resulted in failure of the fence supports from the hydraulic pressure of the water.

From personal observation of the general area and from discussion with residents of the area, it was estimated that the flow in the river would have increased by a factor of over 20 times at the peak of the rainfall event. Upstream of the bridge, a blockage of bamboo stalks created a dam effect that it is believed caused the water coming downstream to rise to an elevation greater than the deck of the bridge. Once this blockage might have lessened, there would have been a “dam break” scenario, with a wall of water travelling down the river like a tidal bore.



Impacts of the Event – Damage and Loss

Of all of the ports under the control of SLASPA, the Hewanorra International Airport was the most affected. Airport management estimated that approximately 7 inches of rainfall would have fallen in a 3-hour period. This extreme rainfall resulted in flooding of the facilities, and as well caused the La Tourney River to overflow its banks, causing a significant amount of damage to facilities. A presentation of **damage** experienced to SLASPA facilities as described in the above referenced meeting is made following:

- A Virgin Atlantic Airbus A-300 aircraft landing during the rainfall event sustained damage to the underside of the aircraft seemingly as a result of water impact. This damage has been valued at US\$400,000 and investigations into the incident are still ongoing.
- Damage occurred to the Turning Bay section of the runway. This occurred due to the fact that repairs to the pavement had been done the night before and the rains were able to cause the work to be undone. This damage was estimated at EC\$90,000.
- Approximately 4,000 feet of perimeter fencing around the airport and runway were brought down due to the fact that debris washed overland would have been trapped against the fencing and the resulting hydraulic forces would have easily overcome the design loading for this structure. This damage has been estimated at EC\$429,300.
- A Car Park machine was destroyed. This has been valued at EC\$17,400.
- Miscellaneous items of maintenance equipment were destroyed. The specific pieces and their respective replacement values are given following:
  - Two (2) lawnmowers were lost at a total value of EC\$4,000
  - A pressure washing machine was destroyed at a value of EC\$3,500
  - A chain saw was destroyed at a value of EC\$3,500

- A refrigerator was destroyed at a value of EC\$2,000
- An electronic gate opener was destroyed at a value of EC\$1,500
- An elevator in the Terminal Building was damaged at an estimated damage value of EC\$150,000.
- All of the cars that were in the parking lot during the event were swamped by the water and effectively written off. It is estimated that there would have been approximately 30 cars there and an average value per car may be estimated at EC\$25,000/car.

In addition to sustaining damage, the Hewanorra International Airport also had **loss**, which was occasioned in a number of ways. The primary of these are described following:

- After the flooding had abated, the runway and Terminal Building had to be washed down to clear away debris and staining. This was done by Fire Service personnel, as well as by private contractors. This has been valued at EC\$160,000.
- The General Manager and Chief Engineer had to make two round trips from Castries to Vieux Fort and these were done by helicopter at a cost of EC\$1,800.
- There was additional administrative work that had to be done by SLASPA Airport personnel, and this was estimated to be at a cost of EC\$24,600.
- Finally there were some aviation related losses that included reduced landing fees, missed departure taxes, etc., and these total EC\$1,900. This number is very small and it is estimated that they were minimised by the fact that the airport and airline operations were virtually doubled on the day after the event, so as to make up for the problems. This had the result of effectively eliminating the losses due to aviation fees.

It was noted at the meeting that the George F.L. Charles Airport suffered no damage or loss during this event. Additionally, no damage was occasioned to either of the seaports. Consequently, this resulted in there being no impacts to the cruise shipping sector whose season runs from approximately October to May. On average, seven (7) vessels per week call at Castries Port, docking at the berths described previously. Typically, they leave at around 5:00 – 6:00 PM and that is the time when the rain started in earnest on Christmas Eve.

#### The Way Forward - Recovery

The SLASPA management has plans to recover and reduce vulnerability of its facilities in a number of ways. These include, *inter alia*: raising the river banks in a number of strategic locations; de-silting the river to increase the waterway conveyance area; and reviewing the adequacy of drainage works within the airport compound. Including the design, construction and supervision of these works, the estimate for implementation was given as EC\$15 million for the river training works and EC\$10 million for the airport drainage works.

A review of the affected area reveals that the airport facility might be made less vulnerable to the effects of river flooding by the construction of a levee or dyke such as shown in the image below. It is suggested that this approach be considered either in place of, or in concert with, river training activities. The height of such a dyke would have to be determined from evaluation of the overland flow elevations from extreme river flows such as the 1-in-50 year, or 1-in-100 year return period events.





Summary of Damage, Loss and Recovery/Reconstruction

The following tables summarise the damage, loss and recovery/reconstruction estimates for this sector.

**Table 18**  
**Damage, loss and recovery estimates – airports and seaports**

<b>Hewanorra International Airport DAMAGE</b>		
	<b>Estimated Cost (EC\$)</b>	<b>Notes</b>
Aircraft underside damage	1,068,000	Virgin Atlantic Airbus A-300
Damage to turning bay area	90,000	
Perimeter fencing repairs	429,300	
Car park machine	17,400	
Miscellaneous maintenance equipment	14,500	
Elevator Electronics	150,000	
Thirty (30) damaged cars	750,000	
<b>TOTAL</b>	<b>2,519,200</b>	

<b>Hewanorra International Airport LOSS</b>		
<b>Item</b>	<b>Estimated Cost (EC\$)</b>	<b>Notes</b>
Wash down of terminal and runway	160,000.00	Existing subsidy levels
Helicopter travel	1,800.00	
Additional administrative work	24,600.00	
Aviation related losses	1,900.00	
<b>TOTAL</b>	<b>188,300.00</b>	

<b>Hewanorra Interntional Airport RECOVERY AND RECONSTRUCTION</b>		
<b>Item</b>	<b>Estimated (EC\$)</b>	<b>Notes</b>
River training: de-silting and raising banks	15,000,000	
Drainage for airport	10,000,000	
<b>TOTAL</b>	<b>25,000,000.00</b>	

<b>TOTAL DAMAGE + LOSS + RECOVERY AND RECONSTRUCTION</b>	<b>27,707,500.00</b>
<b>TOTAL DAMAGE + LOSS</b>	<b>2,707,500.00</b>

Source: Mission estimates

## 9.1 Summary

A review of the pattern of damage that occurred as a result of the December 24<sup>th</sup> 2013 event revealed several similarities with observations from Hurricane Thomas. In fact, certain occurrences seemed to indicate a mode of progressive damage that was most likely initiated by Hurricane Thomas and completed by this event. It is likely that the road failure at Canelles was one such case, as the erosion of the roadway was so catastrophic that it would most certainly have been as a result of cumulative damage.

In order to break out of the vicious cycle of damage and recovery, it is essential that the island's Government put in place a design and recovery programme that would seek to safeguard it and to minimise damage to infrastructure from future extreme events such as extreme rainfall and river flows, hurricane winds, tsunami, storm surge, etc. In addition, it is absolutely essential that critical infrastructure be safeguarded. Some points for further consideration include the need to:

- Safeguard **electricity generating stations** and sub-stations from the impacts of natural hazards through:
  - Identification of risks from natural and anthropogenic hazards that may threaten infrastructure;
  - Mapping and/or quantification of hazards at varying levels of risk exposure;
  - Decision by management as to level of risk exposure that is to be accepted within this sub-sector;
  - Implementation of mitigation strategies to safeguard against the identified hazards.
- Implement designs for drainage works at both **airports**, obtaining historical rainfall data (3-hour and 24-hour rainfall intensity rates) and adopting at the least a **1 in 50 year** return period event as the design event, but preferably using a **1 in 100 year** event for the design of drains and drainage at the two facilities. In addition, for the Hewanorra International Airport, it is essential that river training works be implemented for the La Tourney River, and/or a protective levee or dyke be designed and constructed to prevent future flooding of this facility. River flows in this design should be for the 1- in-100 year river flow condition, and it is essential that some accounting be made of debris flows in the river in the design of bridge waterway openings.
- Design all new bridge and culvert installations along the main **highways/transportation corridors** of the island to accommodate at a minimum, the **1 in 100 year** return period river flow, through detailed consideration of the applicable watersheds. In these designs, it is essential that the potential for debris flows in the rivers be identified and accounted for, such as for example, in the design of bridge waterway areas, the design of bridge piers, etc. For interior bridges and culverts, a 1 in 25 year return period risk level may be appropriate at a minimum.
- De-silting of the **John Compton Dam** in the near to medium term to increase the storage capacity from its present 50% of total to a minimum of 67% of total, with a longer term plan for recovery of 100% of capacity. The longer term plan should be combined with a programme of slope stabilisation of the lands around the dam and construction of micro-dams for silt removal from the rivers feeding the dam.

- Ensuring that the **telecommunications** sector maintains adequate stores to enable rapid recovery from damaging future natural disasters.

## 10.1 Cross-Cutting Issues

### 10.1.1 Gender

The application of gender analysis in any disaster-related policy, strategy and/or program is critical to ensuring that the differential needs of the most affected population are adequately addressed. Accordingly post disaster policies and programmes must be gender responsive and equitable. In order to achieve such, information collected about the post disaster situation must be collected in such a manner that it is presented by sex and age along with other diversities like ethnicities and disabilities. This ensures clear identification of trends across impacted areas, which in turn informs equitable recovery and reconstruction programs.

In Saint Lucia, as with other countries in the OECS region, female single headed households fall within the poorest and most vulnerable of the population. Because of the segmentation that exists in the labour market which results in well-defined male and female jobs combined with the fact that women's jobs are often lower paying than men's jobs, female headed households can find themselves in precarious living conditions. In the case of any shocks, economic, or in this case the result of a natural event, it is likely that these will be the most heavily impacted households.

Visits to the communities support this finding, particularly in the communities in Anse la Raye and Canaries, where many women were unemployed or engaged in low-income earning such as roadside vending.

As a result of the sectoral assessments undertaken as part of the PDNA it is possible to examine how women and men may have been affected differently as a result of the December event.

It would be important to establish in the Housing sector what the sex disaggregation of the ownership structure is so that special measures could be made to support single females who head their households. Such measures may act to reduce the risk of homeless and poor women and their children. In addition since many women use their homes as a place from which to earn their livelihood, loss of home for a single female-headed household may bring additional livelihood burdens.

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## XIII. RECOMMENDATIONS FOR GENDER-AWARENESS IN DISASTER MANAGEMENT AND RESPONSE

- Strengthen the data collection processes in the post disaster situation to ensure that sex disaggregation of the data is possible.  
Investigate further the differential impact of the December event on men and women in the informal economy and the measures that may be necessary to support the development of sustainable livelihoods.
- Develop knowledge of gender analysis within all line ministries, and particularly in the Department of Gender Relations

- Ensure that the Department of Gender Relations is involved in all aspects of risk reduction and building back better, so that the different vulnerabilities of women and men can be addressed .

## 10.2 Environment

The damage and impacts to the Saint Lucian environment of the disasters over the last 20 years and particularly since hurricanes Debbie in 2007 and Tomas in 2011, have been substantial. For example, the capacity of the John Compton reservoir has been reduced to 50% as a result of erosion and landslides. At the same time the marine environment, and in particular the reefs have also suffered from sedimentation from erosion and landslides. The already severe impacts are exacerbated by development practices that put additional stress on the country's natural assets. As a direct consequence the Saint Lucia has become less resilient to disasters and climate change over the last decade.

### Post disaster

The impacts on the environment, as shown in table 19 below, include impacts on resources managed by the Forestry Department and the Water Resource Management Agency (WRMA) and solid waste disposal. The removal of debris is accounted for under infrastructure. Some 155 landslides completely destroyed 50 hectare of government and 10 hectare of private forest lands with an estimated damage of EC\$ 4,065,000 and associated losses of EC\$ 201,720. In addition, an estimated EC\$ 14,250 was spend on clearing of blocked river channels in forest reserves. The Water Resources Management Agency (WRMA) lost some equipment, estimated at EC\$ 252,672. While the Solid Waste Management Authority did not experience any damage, much of the debris collected by the Ministry of Infrastructure has been deposited on the landfill, which caused minor overtime and other charges. Most of the solid waste impacts were incurred by two private sector enterprises located in Cul de Sac. These establishments suffered flood damage to equipment and stocks to the extent of EC\$ 1,120,000 and losses of EC\$ 272,000.

**Table 19 - Damage and Loss to the Environment Sector**

	Damage	Losses	Total Effect
Forestry	4,065,000	215,970	4,280,970
WRMA	252,672	0	252,672
Solid waste	1,120,000	309,430	1,429,430
<b>Total</b>	<b>5,437,672</b>	<b>511,150</b>	<b>6,226,150</b>

Source: Mission estimates

Environmental damage to the marine environment was not quantified but the reefs, particularly those between Canaries and Anse La Raye were and continue to be affected by the through. The effects include sedimentation, eutrophication and algae growth from fertilizers and pollution by flooded piggeries. A feasibility study for coral reefs and sea grass beds enhancements and re-growth in the West Coast Marine Management Area, the marine space adjacent to Laborie and the Point Sable Environment Protection Area is being implemented as part of the World Bank project discussed below.

## XIV. RECOVERY AND RECONSTRUCTION

Following hurricane Tomas the Forestry Department prepared a forestry restoration and rehabilitation plan. Part of this plan has been implemented with support from Australia. In addition, Saint Lucia and the World Bank are in the final stages of the preparation of a Disaster Vulnerability Reduction Project (DVRP) financed by IDA and the Pilot Project for Climate Resilience (PPCR). The aim of this project is to measurably reduce vulnerability to

natural hazards and the adverse impacts of climate change in Saint Lucia. This US\$ 40 million project would cover 5 components, i.e:

1. Prevention and adaptation investments
2. Capacity building for hazard and risk assessment, geospatial data management and applications for improved decision making
3. Adaptation financing facility
4. Contingent emergency response , and
5. Project management and implementation support.

Furthermore, the adaption and implementation of the Protected Area System Plan would further strengthen the physical resilience of the natural environment of St Lucia against future disasters and climate change.

The reconstruction needs as stated in table 20 below are in addition to those activities already financed by the Australian or identified in the World Bank DVRP project.

**Table 20: Reconstruction Needs - Environment**

Activity	EC \$
Integrated Slopes, Landslides and Riverbank Stabilization Project	5,224,689
Further implementation of the Forestry Rehabilitation plan	2,421,918
WRMA expansion network	291,380
SMMA sediment traps	108,000
Solid Waste	1,232,000
Adaption and implementation of the Protected Areas Systems Plan	8,100,000
<b>Total terrestrial and marine environment</b>	<b>17,377,987</b>

Source: Mission estimates

## **11.1 Disaster Risk Management**

Saint Lucia is a Small Island Developing State (SIDS) within the Lesser Antillean Arc of the Caribbean Archipelago, and situated on a volcanic ridge. The island covers a land area of 616 km<sup>2</sup>, characterised by steep, rugged landscapes with deep valleys and fast flowing rivers.

The island experiences a tropical maritime climate with two climatic seasons, a wet season (June to November) and dry season (December to May). Tropical disturbances (waves, depressions, storms, hurricanes) account for the greater amount of the recorded rainfall during the rainy season. As is the case for Caribbean SIDS, GCC is considered one of the most serious threats to the sustainable development of Saint Lucia and the projected impacts are expected to be devastating. The onset of the climate change phenomenon thus imposes new hazards on Saint Lucia and exacerbates existing ones.

The combination of the steep topography and young volcanic soils, constantly subjected to seasonal high rainfall, make the island very susceptible to soil erosion. Poor practices relating to disposal of waste, deforestation and land use also contribute to increased risk to disasters and weakened resilience. Large segments of the island's population are located along the coastal belt, where low land agriculture and coastal resources are the main sources of livelihood. The narrow low land strip which circumscribes the island is characterised by concentrations of haphazard and unplanned human settlement and other development. The rapid urbanisation of former rural areas of the island, manifested in

approximately 60% of the population residing along the north-west corridor, has resulted in denser populations living in unplanned or informal settlements.

### **Overview of Institutional and Legislative Structures**

The regulatory framework for DRM is given effect through the National Emergency Management Plan (NEMP)<sup>14</sup>, which finds authority in the DMA and national CDM Strategy. Also of importance are some key related regulations such as the draft Physical Planning Regulations under the Physical Planning and Development Act (2001); national building codes/standards<sup>15</sup>; and draft Environmental Impact Assessment (EIA) Regulations, which all have significant implications for DRR within the context of development planning. Worthy of note also are emerging trends in international and regional standards and regulations for operations within certain sectors such as agriculture, tourism, education and health, which have a stipulated requirements for disaster risk management.

The NEMP outlines seven (7) policies of relevance to DRR at the national level. These are:

1. Damage Assessment and Needs Analysis [DANA] Policy
2. Disaster Management Policy Framework
3. Donations and Importation of Relief Supplies
4. Emergency Shelter Management
5. Emergency Housing
6. Governmental Officers Security of Travel Policy
7. Hazard Mitigation

### **Mass Fatality**

The institutional framework for national disaster management in Saint Lucia comprises the National Emergency Management Organisation (NEMO), supported by a network of volunteers comprising ten (10) National Disaster Committees and eighteen (18) District Disaster Management Committees, operating under the jurisdiction of the NEMO, and involved in the planning and response against disasters. The NEMO organisational structure also allows for the involvement of the national Community Development Officers to act as Ex-Officio members of the District Disaster Management Committees. The Local Government Councils are also integral to the functioning of the District Committees.

The transition to a comprehensive approach to DRM was influenced by the continued impact of natural hazard events and also development of the regional DRM structures led by the Caribbean Disaster Emergency Management Agency (CDEMA – formerly CDERA) with the 2001 to 2006 Comprehensive Disaster Management (CDM) Strategy and the subsequent 2006 – 2012 and 2014 – 2024 strategies. Furthermore, Saint Lucia is also committed to the implementation of the St George's Declaration of Principles of Environmental Sustainability (SGD) in the OECS7, 1979, which speaks to environmentally sustainable development including disaster risk reduction and reducing the adverse impacts of climate change. Finally at the global level Saint Lucia subscribed to the global Hyogo Framework for Action 2005 – 2015, also providing a context for a developmental approach to DRR.

The structures outlined provide a strong basis for reducing disaster risk, however key drivers of natural hazard risk including poorly planned and managed urbanization, environmental degradation, and poverty continue to challenge the achievement of these goals.

### **Land use as a driver of disaster impact**

The 2011 Post Tomas Damage and Loss Assessment report identified planning issues as a critical element to the longer term addressing of disaster risk. Specifically it was noted *“Perhaps the single most critical issue facing the Physical Planning Section and the DCA is limited technical and administrative capacity for plan preparation and enforcement of building codes and standards. This severely affects their performance in mitigating environmental damage from development and the socio-economic impacts from natural disasters. The Physical Planning Section has indicated a need to increase its staff to (a) build capacity for effective research, analysis and plan preparation, (b) provide adequate cover for regular appraisals of development, monitoring and enforcement of land development and building activity in its eight administrative zones used by Building Inspection Officers, (c) allow development of a specialized unit for monitoring and enforcement, and (d) create an effective communications unit to promote public awareness, education and effect public support.”*

The issues identified in the 2011 assessment included site preparation and construction practices for homes; clearing of lands for agriculture and generally limited consideration to the consequent impact of making slopes unstable and soil erosion and resulting river siltation a challenge.

### Historical Incidence of Hazard Events

Saint Lucia has been subject to a number of natural hazard events which have had a substantive impact on the country and its people. NEMO maintains a Disaster Catalogue organized by hazard type and also chronologically, including both natural and man-induced events. A summary of some recent natural hazard events includes the following:

**Table 21**  
**A summary of some recent natural hazard events**

<b>Date</b>	<b>Event</b>	<b>Impact</b>
1955	Hurricane Janet	Coastal damage and jetties lost
1960	Hurricane Abby	Landslides at Fond St Jacques
1979	Hurricane David	Coastal damage
1999	Hurricane Lenny	Estimated damage of EC \$16.9M
2002	Tropical Storm Lili	4 Deaths 640 houses severely damaged and 24 houses completely destroyed and 16 houses relocated with 500 sought emergency shelters
2004	Hurricane Ivan	Estimated damage of EC 20.3M. Note evacuation order for Anse La Raye ignored
2005	Hurricane Emily	533 houses severely damaged and 18 houses completely destroyed
2010	Hurricane Tomas	Estimated impact EC 900M with significant landslides, flooding and disruption of water to entire island

### Lessons from the December 2013 Low Trough Event

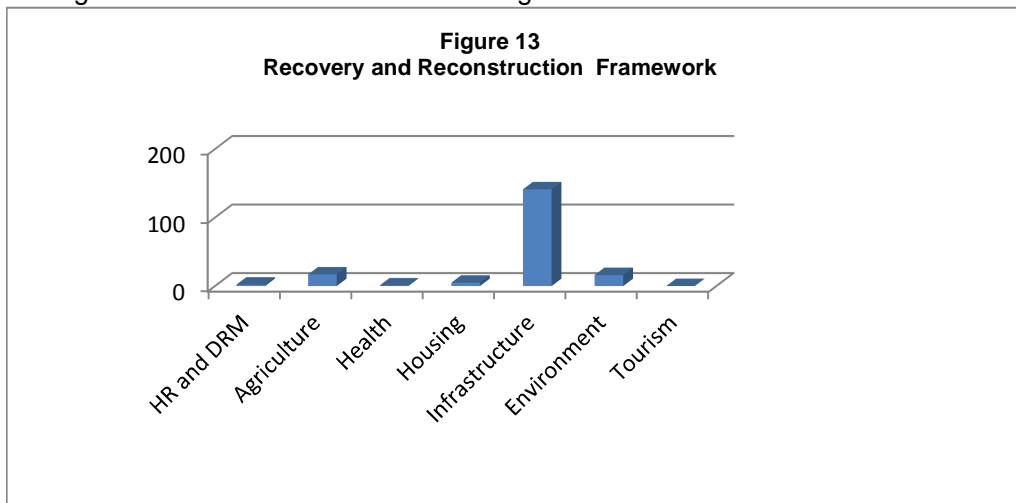
Lessons identified following the trough event and also from the Hurricane Tomas impact include the following:



- Early warning systems need to be reviewed and adapted noting the existing mechanisms with particular consideration to precipitation hazard. There have been a number of tools developed and implemented in support of hydro meteorological EWS including access to radar information and the establishment of the DEWETRA platform managed by the Caribbean institute for Meteorology and Hydrology (CIMH) to provide access to expert analysis of events and likely impacts.
- Based on the above, meteorological services in support of the disaster management structures need to focus on forecasting impacts such as flooding in specific areas and landslides as opposed to general descriptions of events
- Land use regulation should be informed by updated hazard mapping and vulnerability assessments with resultant zoning and development specifications
- Data collection in the post disaster period needs to be enhanced by corporate datasets including socioeconomic and spatially referenced underlying data to better inform analysis of vulnerability and impact. The reporting of impacts, from the initial assessment to the detailed sector damage and needs should be integrated with the socio economic statistical planning structures to better understand impact against underlying vulnerability and to inform recovery and reconstruction strategies. The disaster catalogue should be upgraded to enable Impacts to be captured in a loss accounting database to inform decision making on reducing vulnerability and enhancing resilience
- Sectors disaster plans need to be reviewed and revised with particular focus on mitigation and recovery

### 12.1 Recovery and Reconstruction Framework

The findings of the assessment team have unearthed a number of areas in which major reconstruction works as opposed to marginal damage repairs with some mitigation are required. Any incremental construction work on a facility originally constructed with known design specifications relevant to return periods identified decades ago may run the risk of sophisticating the damage to a structure inherently inadequate for the increased probability of damage due to the effects of climate change.



The tables that recommend recovery and reconstruction are presented in this light. In a number of cases, because of the mechanics of sourcing the required financial resources and because of limitations to absorptive capacity, the time horizons for the accomplishment of the recommended works vary from those that can be accomplished in the short term to those that are longer term in their foreseen implementation. These tables are designed to bring before the planning mechanism in Saint Lucia a list of projects for financing and implementation in an integrated manner consistent with the country's national plans.

The following table is a summary of the reconstruction costs presented in the more detailed tables that follow.

**Table 22**  
**Summary of financing needs for recovery and reconstruction works – EC\$**

<b>Sectors</b>	<b>Totals</b>
Human Recovery and DRM	0.79
Agriculture	6.30
Health	0.34
Housing	1.83
Infrastructure	52.27
Environment	5.98
Tourism	0.00
<b>TOTALS USD</b>	<b>67.51</b>
<b>Sectors</b>	<b>Totals EC</b>
HR and DRM	2.13
Agriculture	17.01
Health	0.91
Housing	4.94
Infrastructure	141.13
Environment	16.15
Tourism	0
<b>TOTALS XCD</b>	<b>182.27</b>

Recovery and Reconstruction - Agriculture Sector								
Sector	Sub-Sector	Activity	EC\$	Responsible Agency	Short Term	Medium Term	Long Term	Comments
Agriculture	Engineering /Farm Machinery and equipment	Develop agriculturing engineering programme for land preparation and development including drainage,	3,962,461	MOA; Taiwanese Mission	X	X	X	An engineering programme to provide services to farmers should be established within the Ministry of Agriculture. This programme will support land preparation and development to

		irrigation and stabilisation						include tillage, drainage, irrigation, river bank protection, grass barriers, strip cropping, contour planting, check dams to reduce surface and gully erosion and storm and contour drains. Engineering programme should also include agronomic interventions
	Natural resource management and climate change adaptation	Establishment of integrated soil conservation and land management measures in the upper and middle sections of the water sheds and the lower catchment areas using GIS platform	10,450,300	MOA, Taiwanese, FAO, IICA, CARDI, OECS	X	X	X	Further develop GIS platform and extend capacity to Ministry of Agriculture
	Banana and Plantain	Procurement and distribution of fertilisers; procurement and application of fungicides;	250,000	MOA/FAO/IICA/OECS	x	X		Needed in the very short run to improve plant nutrition and reduce the spread of yellow and black sigatoka
	Root crops and vegetables	Procurement and distribution of fertilisers;	517,749	MOA/FAO/IICA/OECS	x	x		Actions should be accompanied by soil and water conservation measures and soil amelioration measures. There is urgent need to mainstream climate change adaptation and mitigation measures within agric. Planning. This should include soil and water conservation, rain water harvesting, the use of drought resistant and hybrid cultivars as well as protected agriculture. Germplasm conservation across sub sectors requires immediate attention
	Tree crops	Implementation of agro-forestry programme; and production and distribution of tree crops under a development and expansion programme	250,000	MOA/FAO/IICA/OECS		x	x	Need to incorporate tree crops in soil and water conservation and agro-forestry systems in the medium to long run. Clean up operations on the Leeward requires immediate attention.
	Livestock	General		FAO/MOA				
		Expansion of the Artificial Insemination (AI) service to rapidly improve stock and productivity; establishment of stud facilities; expansion of forage banks; and farmer training	130,000		x	x	x	AI for small ruminants, pigs and cattle

	Poultry	Provision of feed and chicks to poultry farmers	179,200		x			Immediate intervention required for replacement of feed and chicks, repairs to housing infrastructure and replacement of equipment in the hatchery unit to ensure continued poultry production.
	Pigs	Provision of feed and animals to farmers; purchase of pedigree stock; provision of AI service to farmers	390,000		x	x		Farmers who lost animals should be compensated with replacement of animals and feed and should be offered AI service.
	Small Ruminants							
		Importation of improve small ruminant stock; repair to small stock infrastructure; and implementation of a heat synchronization and AI programme	745,000	FAO/MOA	x	x		Where there are no animals to synchronize because of loss, stock should be given to farmers. Animals will have to be imported for breeding and expansion of small ruminant programme.
	Fisheries	Re-establishment/desilting of aquaculture ponds; rehabilitation of piping system; provision of stock; installation of washout ponds; replacement of tools and equipment.	139,200	FAO/MOA/ Taiwanese Mission	x			
		Total	17,013,910.00					

Recovery and Reconstruction- Health Sector								
Sector	Sub Sector	Activity	EC\$	Responsible Agency	Short Term	Medium Term	Long Term	Comments
Social	Health and well being	Re-build Anse La Raye Health Center	757,000	Ministry of Health			X	This will ensure the provision of improved primary care for persons communities
	Health and well being	Re-build Canaries Health Center	68,000	Ministry of Health			X	This will ensure the provision of improved primary care for persons communities
	Health and well being	Rain Water Harvesting	80,709	Ministry of Health		X		In Medium -term water security would ensure continued Health services
Totals			905709					

**RECOVERY AND RECONSTRUCTION - INFRASTRUCTURE SECTOR**

Sector	Sub-Sector	Activity	EC\$	Responsible Agency	Short Term	Medium Term	Long Term	Comments
INFRASTRUCTURE	Electricity	Early warning system installed at Union	100,000	LUCELEC	x			Maintenance of EWS equipment is critical to their continued trouble-free operation
		Raise station equipment above flood line or install a dyke	2,000,000	LUCELEC		x		Will require specialised engineering considerations to retain structural integrity of existing buildings and equipment
		Relocate sub-station from Union	10,000,000	LUCELEC			x	Will require a full-scale EIA to confirm a suitable new location
	Ports	Design and installation of a levee to protect the airport terminal from future extreme flooding	15,000,000	SLASPA			x	Will require flood plain mapping for the lower reaches of the La Tourney River. Designs should consider the potential for debris jams in the river
		Design and construction of drainage interventions for the airport compound including the runway and apron areas	10,000,000	SLASPA		x		Designs must take into account the potential for more intense rainfall as a result of climate change impacts
	Telecoms	Ensure that adequate spares exist that would allow for a rapid return to normalcy following a natural disaster	1,068,000	Digicel and LIME	x	x		
	Water and Sanitation	Relocation of pipelines away from most vulnerable areas	3,604,500	WASCO		x	x	
		Cleaning of catchment zones in areas of raw water intake structures	300,000	WASCO	x	x		
		Design and construction of micro-dams to assist in removal of sediment from intake structure areas	600,000	Forestry Department		x		

		De-silting of John Compton Dam	80,100,000	MTW/WASCO	x	x	x	Suggested dredging of 500,000 cubic metres which would improve actual storage capacity from 50% of total potential to 67% of total potential
	Roads and Bridges - Transport	Carry out pre-engineering investigations for bridge and roadway designs - geotechnical investigations and hydrologic/hydraulic investigations	3,000,000	MTW	x	x		Use should be made as much as possible of existing or ongoing watershed studies. In addition, the most vulnerable areas and watersheds should be prioritised
		Engineering design investigations	4,841,000	MTW/External Consultants		x		Care should be taken to ensure that designs are carried out for a range of risk levels - For example the 1 in 25, 1 in 50 and 1 in 100 year return period events should be used in the design
		Construction supervision	10,503,000	MTW/External Consultants		x	x	Some amount of meaningful technology transfer should be incorporated into the contracts for construction supervision
		Watershed rehabilitation initiatives	10,000	Forestry Department	x	x		This initiative is intended to mainstream appropriate watershed preservation activities
			141,126,500.00					

Recovery and Reconstruction - Housing Sector								
Sector	Sub Sector	Activity	EC\$	Responsible Agency	Short Term	Medium Term	Long Term	Comments
Social	Housing	Relocation of at-risk houses	4941130	Ministry of Housing		X		This reduces the risk of more severe damage and loss of life in areas of high vulnerability to flooding
TOTAL			4,941,130					

## Supporting tables to Agriculture note

Table: Summary of Total Impact of the Low-Level Trough

ITEMS	EC \$
<b>TOTAL EFFECT</b>	<b>33,712,948</b>
<b>TOTAL DAMAGE</b>	<b>23,867,157</b>
Banana/Plantains	3,852,800
Other Crops	2,953,190
Livestock	518100
Fisheries	<b>540,255</b>
Farm Infrastructure	14201192
Farm Roads	1,801,620
Land Loss	-
<b>TOTAL LOSS</b>	<b>9,845,791</b>
Banana/Plantains	1,733,760
Other Crops	590,635
Livestock	122,415
Fisheries	152,260
Farm Infrastructure	6,379,020
Farm Roads	600,101
Land Loss	267,600



The details of total impact of the event on the sector by region and by sub-sector are presented in **Table 5**.

**TABLE: Total Impact of Low-Level Trough on the Agricultural Sector (EC\$)**

Region	Banana/Plantain	Other Crops	Livestock	Fisheries	Farm Infrastructure	Farm Roads	Land Loss	Total Impact
1	-	36,270	3,995	-	190,190	-	-	250,555
2	-	174,155	6,230	=	810810	20,100	-	1,186,835
3	1,619,940	54,180	44,195	63,285	2,335,180	195,640	-	4,991,122
4	1,908,200	629,735	144,935	70,720	2,929,087	8874,342	-	6,301,752
5	868,840	941,220	336,480	45,940	3513,660	619,075	-	5,868,334
6	-	119,610	34,650,	-512,570	833,750	162,194	-	1,984,050
7	767,340	1,341,065	12,915	-	3,296,355	483,470	-	5,464,575
8	422,240	247,590	57,115	-	6,671,180	46,900	-	7,398,125
Others	-	-	-	-	-	-	267,600	267,600
<b>Total</b>	<b>5,586,560</b>	<b>3,543,825</b>	<b>640,515</b>	<b>692,515</b>	<b>20,580,212</b>	<b>2,401,721</b>	<b>267,600</b>	<b>33,712,948</b>
<b>%</b>	<b>16.6</b>	<b>10.5</b>	<b>1.9</b>	<b>2.1</b>	<b>61.0</b>	<b>7.1</b>	<b>0.8</b>	