Socio-economic and Environmental Disaster Impact Assessment Handbook for Jamaica

A quick guide to undertaking an assessment using the DaLA methodology following an extreme event in Jamaica

Prepared under the Pilot Programme for Climate Resilience (PPCR) Phase 1

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List of Acronyms

BOP	-	Balance of Payments
CDCC	-	Caribbean Development and Cooperation Committee
CEO	-	Chief Executive Officer
DaLA	-	Damage and Loss Assessment
DFID	-	Division for International Development (UK)
DRM	-	Disaster Risk Management
ECLAC	-	Economic Commission for Latin America and the Caribbean
GDP	-	Gross Domestic Product
GFDRR	-	Global Facility for Disaster Reduction and Recovery
GIS	-	Geographic Information System
GNSS	-	Global Navigation Satellite System
IBRD	-	International Bank for Reconstruction and Development/ The World Bank
IDAs	-	Initial Disaster Assessors
IICA	-	Inter American Institute for Cooperation on Agriculture
MDG	-	Millennium Development Goals
ODPEM	-	Office of Disaster Preparedness and Emergency Management
PIOJ	-	Planning Institute of Jamaica
SLA	-	Sustainable Livelihoods Approach
STATIN	-	Statistical Institute of Jamaica
UNISDR	-	United Nations Office for Disaster Risk Reduction
WB	-	International Bank for Reconstruction and Development/ The World Bank

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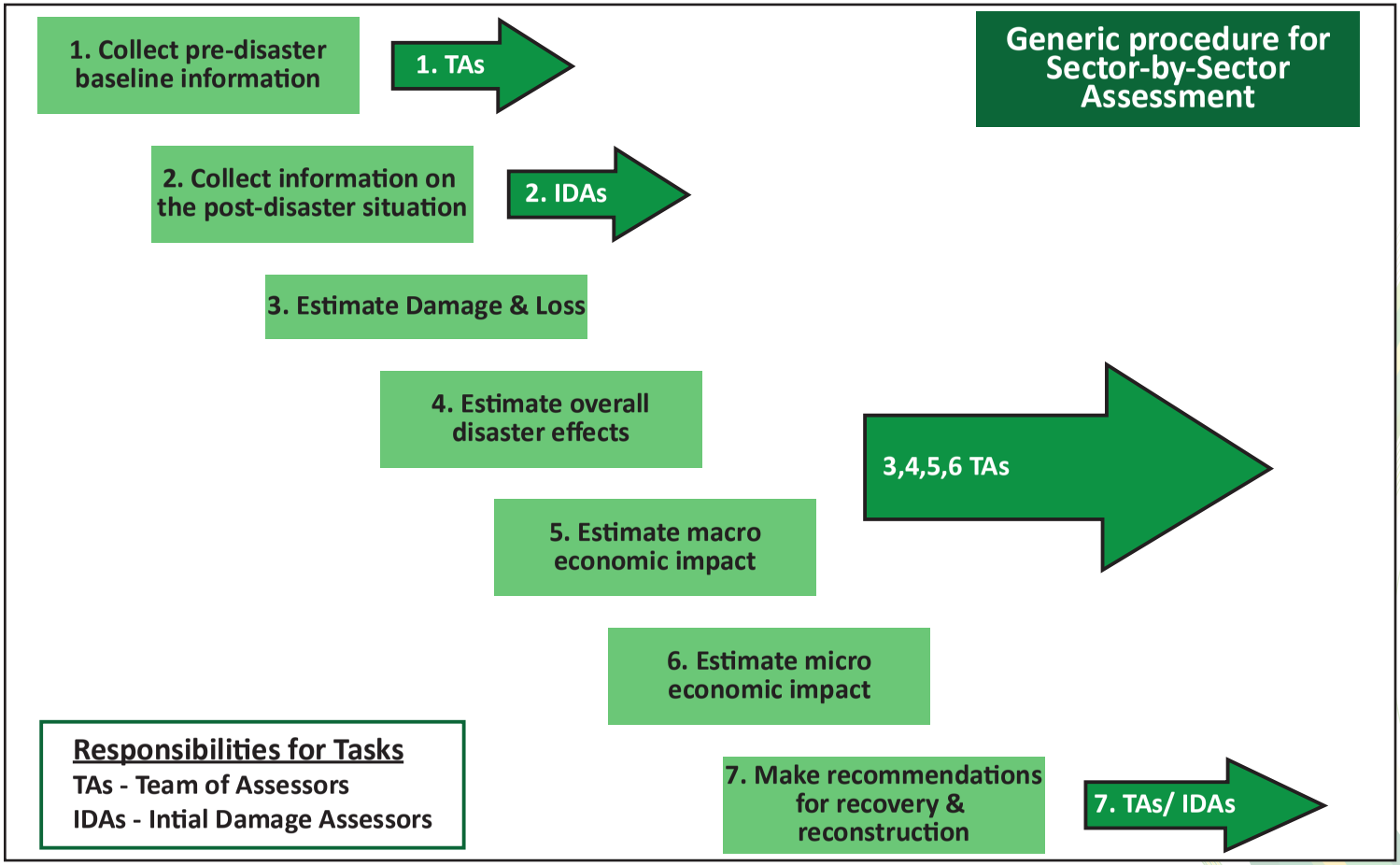
Generic procedure for Sector-by-Sector Assessment
1. Collect pre-disaster baseline information
1. TAs
2. Collect information on the post-disaster situation
2. IDAs
3. Estimate Damage & Loss
4. Estimate overall disaster effects
3,4,5,6 TAs
5. Estimate macro economic impact
6. Estimate micro economic impact
Responsibilities for Tasks
TAs - Team of Assessors
IDAs - Intial Damage Assessors
7. Make recommendations for recovery & reconstruction
7. TAs/ IDAs

Section I
Introduction

Over the last 25 - 30 years, Jamaica has experienced an increase in the frequency of natural events, primarily floods related to inclement weather, tropical depressions, tropical storms, hurricanes, and droughts. Some of the more recent meteorological events that have severely impacted Jamaica include Hurricane Ivan in 2004, Hurricanes Emily and Dennis in 2005, Hurricane Dean in 2007 and Tropical Storm Gustav in 2008. Between 2001 and 2010, Jamaica had been impacted by 10 disaster events, resulting in cost to the country estimated at approximately $111.81 billion. The adverse environmental impacts included a decline in the health of coral reefs; loss of sea-grass beds; severe beach erosion and loss of forested areas. These events have also resulted in significant social dislocation, economic losses and damage. For instance, in 2004, Hurricane Ivan resulted in damage totalling J$35 billion while Hurricane Dean in 2007 left J$23 billion in damage. The magnitude of these damage and losses is expected to increase significantly moving from an average 2% of GDP in the last decade to close to 14% by 2025.

Recently available projections for climate change suggest that countries like Jamaica will be severely threatened by direct and indirect impacts of climate change such as increased coastal flooding, storm surge, landslides and loss in agricultural productivity, all of which would have deleterious effects on the economy and society. Adequate disaster risk management inclusive of climate change adaptation is, therefore, critical for the island as failure to implement such measures can only serve to retard the achievement of the country's sustainable development goals under Vision 2030 Jamaica-National Development Plan and its ability to meet internationally agreed development targets such as the Millennium Development Goals.

A major challenge faced by Jamaica is the continued need to prepare thorough post-disaster impact assessments. Since 2004, the PIOJ has hosted several capacity building training workshops in the use of the Economic Commission for Latin America and the Caribbean/Damage and Loss Assessment (ECLAC/DaLA) methodology. This has strengthened the capability of the Institute to more effectively co-ordinate the preparation of post-disaster socio-economic and environmental assessment reports for hurricanes and other natural disasters affecting the island. These reports have played an integral role in assisting the government in identifying key sectors or areas for prime recovery and restoration activities after a major disaster event. Unfortunately, due to staff turnover in key supporting agencies, knowledge management has become a key challenge.

The production of this handbook is a key step in harnessing the knowledge around assessment of extreme events in Jamaica. It will strengthen not only the capacity of the PIOJ resulting in an improved reporting process, but will also increase PIOJ's capacity to share this knowledge in an organised and easy manner with others. It will serve as a quick guide to the use of the DaLA methodology by stakeholders in the social, economic and environment sectors of Jamaica. The end result will be better informed decisions regarding the allocation of resources for Jamaica's disaster risk reduction programme.

The Handbook is intended for practitioners who are experts in their own fields and who are brought together to conduct assessments of extreme events. They are referred to in the Handbook as Assessors. The expectation is that Assessors have been trained in the use of the DaLA methodology and may have been involved in the conduct of an assessment in the past. The Handbook then, is meant to reinforce knowledge already learned, and also to clarify any doubts that may arise as one proceeds with undertaking an assessment. The Handbook is also meant to provide the most current information on the DaLA and its uses.

The structure of the Handbook is such that the basic concepts underpinning the methodology are easily explained, and instructions for undertaking the assessment are provided through step by step procedures, quick guides, examples, illustrations and charts. The Handbook also provides some guidance on how to prepare the final report.

Through a reference section, the Handbook provides for its users a brief listing with addresses to sites and sources where additional information and more elaborate theoretical explanations can be found.

Section II
The Methodology

1. Background

The methodology for the macro-socio economic and environmental disaster assessment was developed by the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), based on its work in Central America in the early 1970's.

It has come to be known by its short name Damage and Loss Assessment methodology (DaLA) and more recently as the core methodology of the PDNA, or Post Disaster Needs Assessment undertaken jointly by the World Bank, European Commission and the United Nations system. The terminology of the Methodology has been changed over time to better reflect the intent of the methodology and experience in the use of the methodology has enabled a more robust offering of guidance.

Initially, the methodology was used in Central and South America, by a team of young assessors led by Roberto Jovel and later included Ricardo Zapata-Marti, the focal point for Disaster Risk Reduction in the ECLAC system. Out of their labour came several versions of the Handbook for estimating the socio-economic and environmental effects of disasters produced by ECLAC. The most widely used was published in 2003. The Central and South American team was eventually enlarged to include colleagues from the Caribbean Sub-regional Headquarters of ECLAC, namely Asha Kambon, Lance Busby, Erik Bloommestein, Esteban Perez, Michael Hendrickson and experts drawn from other organisations such as Dr Vincent Little from IICA and Dr David Smith, of Smith Warner International.

In the late 1990's the then Director of the ECLAC, Caribbean Sub-regional Headquarters, Dr Len Ishmael, in response to the expressed need by governments in the sub-region to understand the total effects of disasters and its impacts on their economies, sought the application of the methodology to the predominantly service economies of the Caribbean. Under her leadership the methodology was deepened to consider the environmental impact of disasters (with an emphasis on coastal zones) and infrastructure to include and take note of the fact that much of the built environment in the Caribbean was coastal. Renewed interest was paid to the affected population going beyond the numbers that had died as a result of the event and seeking to understand more fully the impact of the event on women and men. The culmination of this exploration was the production of a training manual for small island developing states (SIDS) published in 2004, the ECLAC/CDCC

Disaster Assessment Training Manual for Caribbean Small Island Developing States (SIDS).

The information presented in this Handbook is a culmination of the work initially produced by the United Nations ECLAC, and more recently undertaken by the World Bank (IBRD), and their team of Assessors. It is produced as a quick guide to undertaking assessments and Assessors are advised for fuller and more expansive explanations to revert to the detailed Handbook (Vol. 1,2,3,4) published by ECLAC, the SIDS Manual, published by ECLAC/ CDCC and the more recently published, Damage and Loss and Needs Assessment Guidance Notes (Vol. 1,2,3) published by the Global Facility for Disaster Reduction and Recovery (GFDRR), of the World Bank.

2. The Conceptual Framework

The methodology for undertaking a macro socio-economic and environmental assessment of the effects of a disaster or extreme event is conceptually a counterfactual exercise[1], based on a simple stock flow analysis. It hinges around a consistent approach to the valuation of the effects of a disaster on a society and its economy. 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. 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, etcetera). Its monetary value is expressed in terms of replacement costs according to prices prevailing just before the event.[2]

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[1] *A Counterfactual exercise would express what has not happened, but what could, would, or might occur under differing conditions.*

[2] *Damage, Loss and Needs Assessment: Guidance Notes Volume 2 (2010). The International Bank for Reconstruction and Development/ The World Bank. Pg 2.*

Losses are defined as changes in economic flows arising from the disaster. They occur until full economic recovery and reconstruction is achieved, in some cases lasting for several years. Typical losses include the decline in output in productive sectors (agriculture, livestock, fisheries, industry, commerce, tourism). [3]

The task of estimation of the damage and losses is one of the critical components of the assessment methodology. The second critical component is the impact analysis on the economy and the society, which is based largely on the estimate of losses. Together, these two components can be said to comprise the DaLA. One of the benefits of the DaLA is that its outcome can be used in planning for recovery and reconstruction. The value of damage is used as the basis for estimating reconstruction needs while the value of losses provides the means for estimating the needs for economic recovery.

Figure 1 presents a schema for the damage and loss assessment methodology, depicting the last column as the space in which the macro and micro socio-economic impact of the event on the economy and the society is analysed.

It is important to note that damage and loss have a temporal dimension, damage occurring at the time or immediately after an event and losses occurring from the time of the event for a period that could continue anytime from months to years, when full recovery and reconstruction take place.

The ultimate goal of the assessment is to measure in monetary and social terms the impact of disasters on the society, economy and the environment of the affected country or region and to enable the quantification of the financial needs for economic recovery and reconstruction, with risk reduction.

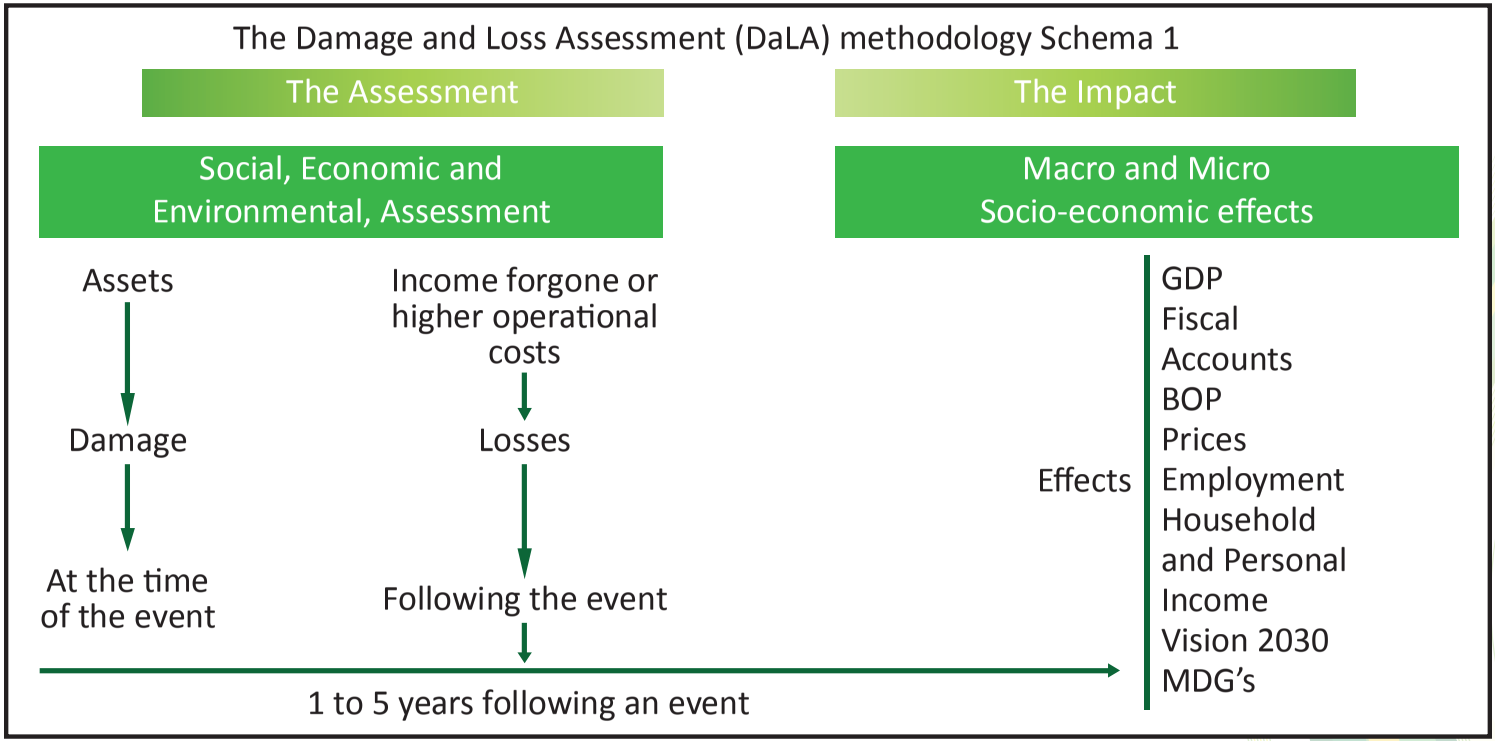
The difference between the DaLA and other methodologies in use in the DRM process is that many methodologies only address one sector of the economy, refer to one stage in the disaster cycle, or focus on the humanitarian assistance stage of a disaster.

The DaLA has been used in the Caribbean and Latin America , Asia, and Africa to estimate the damage and loss following extreme events such as the following :

- Floods and Hurricanes , Earthquakes (Haiti) in the Caribbean and Latin America
- Tsunami – Indian Ocean
- Drought - East Africa
- Health Pandemics - Asia and Central America
- Conflict situations - Jamaica and Mexico.

[3] *Ibid*

Figure 1. The DaLA Methodology - The Conceptual Framework



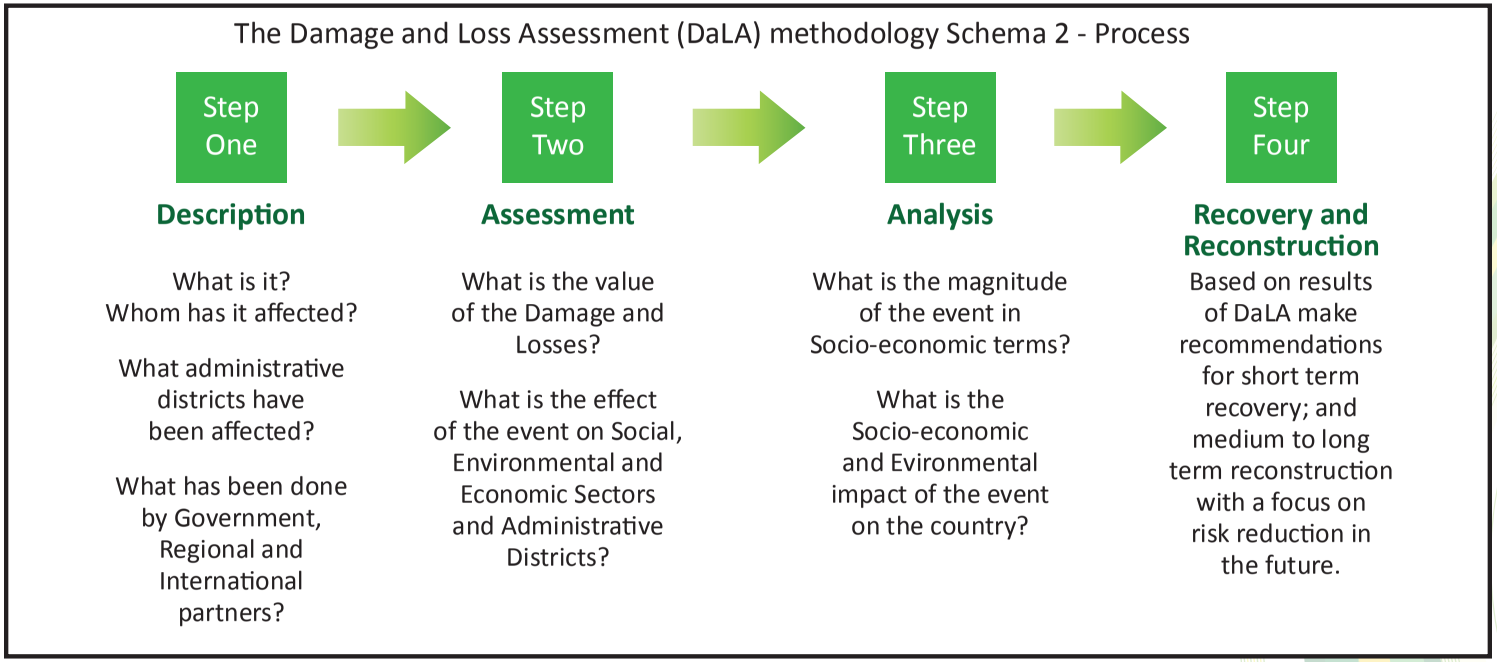
Source: Adapted from SIDS Manual (Training Materials)

The methodology requires the use of two sets of data: the baseline data which provides information regarding the situation before the event; and the data which presents the situation as a result of the event, or the post-disaster situation. The more accurate each data set, the more precise the results of the assessment.

The methodology can be seen as a four step process in which a team of assessors first describe the event, then estimate the extent of damage and losses to the social, economic and environmental sectors of the economy and parishes or Administrative districts of the country, then conduct an impact analysis of the event at the macro and micro economic levels. The process concludes with the use of the assessment results to estimate requirements for financial recovery and reconstruction, with the notion of risk reduction or "building back better".

Figure 2 provides a schema of a step by step process for the unfolding of the methodology.

Figure 2. Schema of DaLA Process



Source: Adapted from SIDS Manual (Training Materials)

Section III

Procedures for Conducting an Assessment

1. Institutional Mechanisms for the Conduct of an Assessment

Experience suggests that a single institution should be designated as the body which coordinates and conducts the DaLA following an event. The best characteristics for such an institution is that it:

i. is fully empowered and have the authority to collect data across Government Ministries, across Administrative Districts and within the private sector;

ii. has a multi-disciplinary human resource capacity at its disposal;

iii. has the capacity to manage data and conduct a rigorous analysis;

iv. has experience and the respect of the national community in the conduct of socio-economic and environmental studies;

v. has the reputation of the conduct of impartial studies;

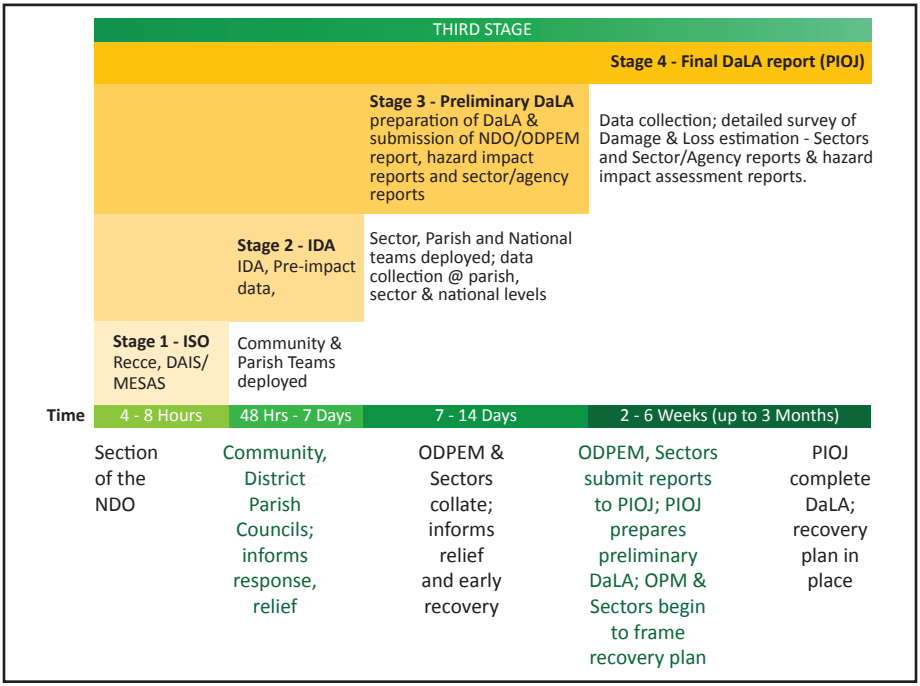
vi. is not involved in relief or rescue operations.

The Government of Jamaica in its National Disaster Plan has designated the PIOJ as the lead agency responsible for the conduct of the DaLA in the event of a disaster. The Socio-Economic and Environmental Impact Assessment Core Team, coordinated by the PIOJ, has been established to facilitate the timely, efficient collection of post disaster information towards the preparation of a comprehensive Socio-Economic and Environmental Impact Assessment Report using the DaLA.

The Manager of the Sustainable Development and Regional Planning Division (SDRPD) of the PIOJ will lead the Core Team, which is comprised of, but not limited to representatives of the following organisations: Office of Disaster Preparedness and Emergency Management; National Environment and Planning Agency; Ministry of Labour & Social Security; Jamaica Public Service; National Water Commission; National Works Agency; Ministry of Health; Ministry of Agriculture; Department of Local Government; Ministry of Education; Ministry of Tourism; Private Sector Organisation of Jamaica; PIOJ (relevant divisions). The SDRPD will be the Secretariat for the team.

In the National Disaster Plan the framework for the management of the assessment process is outlined in the following schema[4]:

Figure 3. Damage Assessment & Needs Analysis Framework

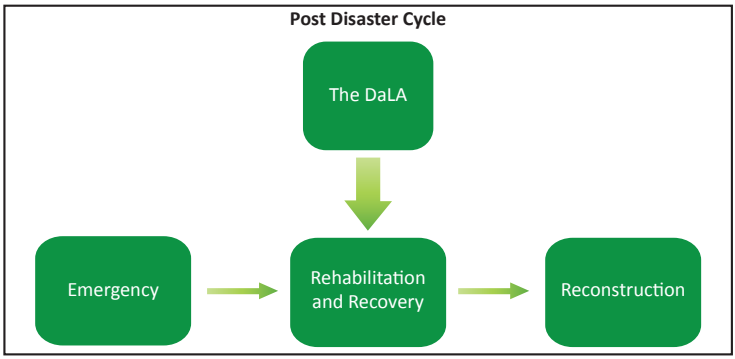


Source: Adapted from draft "Jamaica Damage Assessment Plan"

Figure 3 suggests a time frame of two to six weeks following an event within which the DaLA could take place. Whatever the specific time frame, experience suggests that the DaLA should not take place until the humanitarian assistance and relief aspects of the event are well underway or completed and could occur during the recovery and rehabilitation processes but certainly not during the reconstruction effort as the outcome of the DaLA should inform long term reconstruction, as depicted in *figure 4*.

[4] *National Damage Assessment Plan. Annex 11/16/2011. Pg 7*

Figure 4. The Post Disaster Cycle

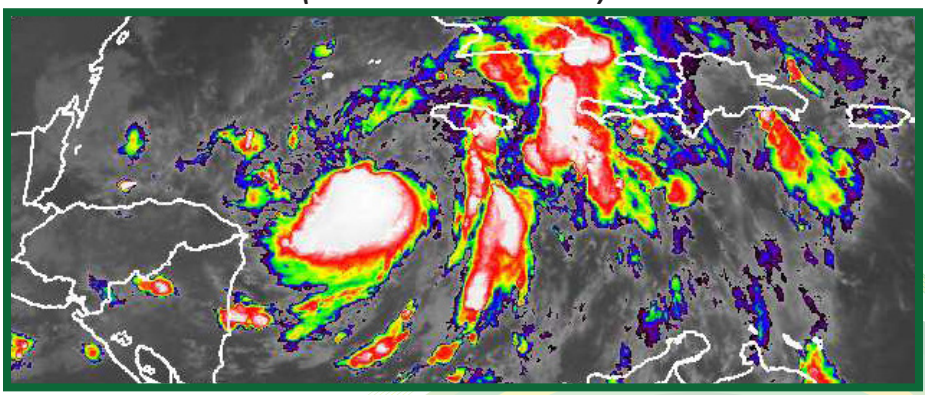


Source: Adapted from SIDS (Training Manual)

2. Sources of information to understand the event

It is very important to remember that the basis of an assessment following an event is the scientific information about the event. Such information, based on the nature of the event, may initially be provided by the Meteorological Division, the Earthquake Unit of the UWI, or the Mines and Geology Division of the Ministry of Energy and Mining. The Mines and Geology Division conducts Geotechnical/susceptibility (natural hazard) assessments to guide decision makers in developmental decisions in mitigating/reducing the risk from natural disasters to life and property. All scientific information regarding the event is collected for final dissemination by ODPEM and made available to the Assessors. The scientific information (e.g. Figure 5), regarding an event provides the basis for the geophysical and socio demographic parameters of the investigation.

Figure 5. Satellite Image of Rain Bands Associated with Hurricane Wilma (October 17 at 4:35 a.m.)



Source: Macro Socio-Economic and Environment Assessment of the Damage and Loss Caused by Hurricane Wilma (2005)

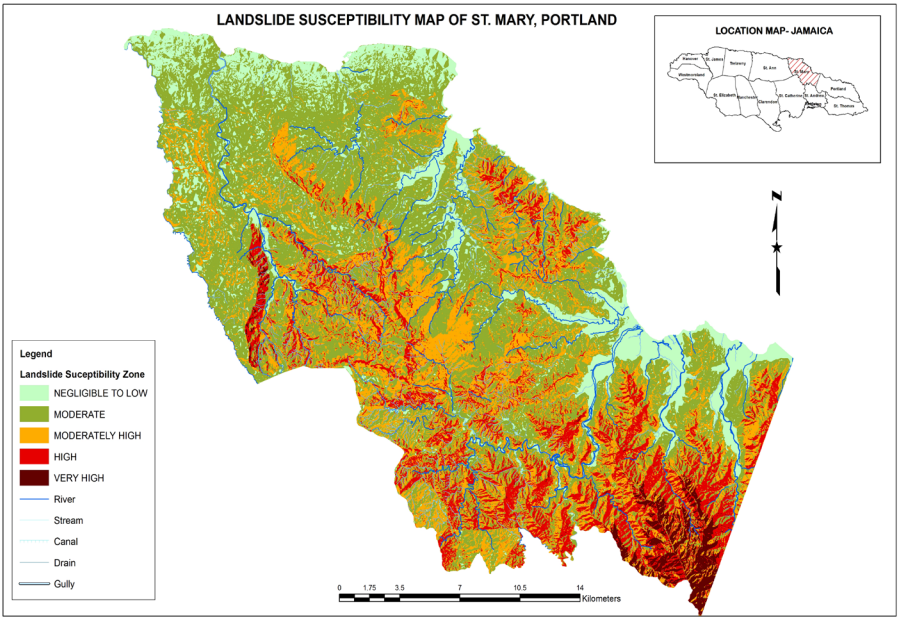
Table 1. Cumulative Point Rainfall (Oct 13 2005) Climatological Mean. Final Assessment Report on Hurricane Wilma (2005)

Parish/Station	Wilma Rainfall (mm)									30-year Mean	% of Mean
		14	15	16	17	18	19	20	Tot.		
Kingston/St. Andrew											
Norman Manley International Airport		17	44	80	79	51	70		341	167	204
Norbrook		14	89	160	85	35	21		403	N/A	N/A
Waterloo Road		244				53	119		416	213	195
St. Thomas											
Norris		14	88	152		155	130		539	N/A	N/A
Cedar Valley		57	137	175	110	188	74		741	518	143
Ramble		51	171	107	68	139	81		616	386	160
Portland											
Swift River		155				85			240	232	103
Comfort Castle		-	71	101	71	72	-		316	N/A	N/A
St. Mary											
Hampstead		63				26	-		89	301	29
Richmond		60	49	79	30	33	2		255	214	119
St. James											
Sangster's International Airport		77	3	1	12	39	12		144	166	86
Mount Horeb		51	25	30	27	29	24		186	277	67
Westmoreland											
Frome (Climo)		12	9	11	26	54	23		135	273	49
Negril Lighthouse		42	6	105	36	106	24		319	186	172
Non-Pariel		50	206				60		316	203	156
Retreat		-	109				33		142	206	69
St. Elizabeth											
Accompong		138			79		57		274	574	48
Appleton		5	20		44	89	27		185	323	57
Barton Isle		4	10	22	38	82	25		180	305	59
Manchester											
Old England		82					80		162	315	51
J.J. Gagnon		10	18	61	138	140	108		475	N/A	N/A
Evergreen		5	7	20	73	108	73		286	302	95
Clarendon											
Beckford Kraal		13	39	78	278	78	53		537	356	151
Crofts Hill		40	50	84	270	106	28		578	317	182
St. Catherine											
Bois Content		34	75	154	255	N/A	N/A		518	318	163
Tulloch Estates		36	41	145	160				381	292	130
Bybrook		42	33	120	155	62	48		460	234	197
Worthy Park Estate		48	33	98	94	165	18		456	261	175

Source: Meteorological Division

The information in *Table 1* is an example of the data that can be provided by the Meteorological Service regarding the distribution of rainfall. An example of the material available from the Division of Mines and Geology are landslide susceptibility or hazard maps. These may be used to display the spatial distribution of landslide hazard zones in a given area (as seen in *figure 6*) and can be very useful to the Assessors in understanding the effects of an event and during the development of recommendations for natural hazard mitigation, physical planning and future development. This baseline information layered with the post disaster information collected through the Assessment process can be presented in the report through the use of GIS and can assist decision makers in easy interpretation of key data.

Figure 6.



Source: Mines and Geology Division, Ministry of Energy and Mining, Jamaica

3. Identification of the team of Assessors

Based on the nature of the event, a multi-disciplinary team of assessors will need to be identified to undertake the assessment. The Assessors need to be experts in their specific field of investigation with a rigorous approach to their work as they are expected to verify the data presented to them by the

first level Assessors or Initial Damage Assessors (IDAs), as they are called. In the verification exercise they may be required to undertake field visits. They should be able to identify gaps in existing data and identify feasible (rapid assessment) methodologies to collect additional data that may be required.

The Assessment team may include experts drawn from the following fields: Social Scientist-Macro Economists, Agricultural Economists, Agronomists and Sociologists; Environmental and Sustainable Development; Engineering – Civil and Coastal, Geophysical; Gender and Development; GIS and Information Technology; and Telecommunications.

Attributes of good Assessors

Assessors should:

- have received training in the DaLA methodology.
- have an interest in and commitment to the assessment process.
- have credibility with peers and actors in their respective field.
- be self-motivated and able to motivate others.
- have excellent data management skills, capable of meeting the challenges of accessing baseline data, data sharing and the use of maps.
- have good time management skills and dedicated time to conduct task.
- have the ability to perform assessments without bias, or vested interest in the specific outcome.
- be able to make an expert judgment (in collaboration with the data provider if required) about the quality of the data provided.

4. Identification of resources and logistical support

It is important that the Assessment Team has at its disposal, the resources required for conducting its exercise. These may be financial, human or physical. If this is detailed before the exercise begins, then delays and inconveniences can be reduced, thus avoiding wastage and increasing costs.

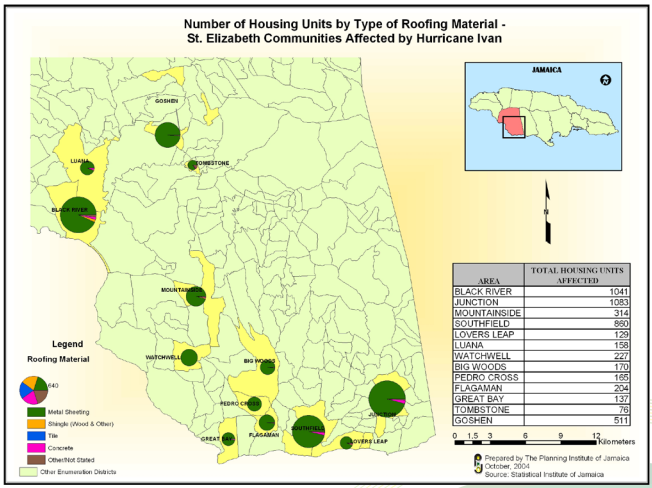
A budget should be prepared for the conduct of an Assessment, and be efficiently managed. Since the DaLA is a rapid assessment process, unnecessary delays and inconveniences are to be avoided. Logistical support may include air or ground transportation to isolated areas to verify data or security back-up if such is necessary, due to unsafe or distant terrain. Overnight stays may be required for the Assessors to verify data in distant locations and meals may be required on long journeys. Telecommunications equipment may be necessary.

5. The Importance of GIS to the Disaster Impact Assessment Process

a. What is a Geographic Information System?

A Geographic Information System (GIS) integrates hardware, software, and data for capturing, managing, analysing, and displaying all forms of geographically referenced information. While GIS is often associated with visualizing data in many ways such as maps, globes, reports, and charts, the ultimate purpose of GIS is to provide support for decision-making. It allows users to view, understand, question, and interpret spatial data in ways that reveal relationships, patterns, and trends that otherwise would not be readily seen. GIS, is therefore, important for aiding hazard prevention and for simulating the damage that would be caused in the event of a natural disaster (Azaz, 2007).

Example of map created using GIS software



b. The Importance of Geospatial Technology to Disaster Impact Assessment

The use of Geospatial technology is critical throughout the impact assessment process, both immediately after the disaster where an Initial Damage

Assessment (IDA) identifying immediate needs and priority actions is necessary, and a few weeks after the disaster when a more detailed assessment using the DaLA methodology is required. Table 2 outlines some of the benefits of Geospatial technology in the assessment process and why its use should be an important part of any effective disaster management plan.

Table 2. Uses of Geospatial Technology in Impact Assessment

Uses of Geospatial Technology in Impact Assessment	Benefits
Preparation of general orientation maps	General orientation maps of areas affected can allow first responders and emergency management officials to manage staff and volunteers involved in the impact assessment process.
Mapping the areas and sectors affected by the event	GIS software can be used to generate maps of the general areas impacted by an event. In the case of a hurricane, a map of the path of the hurricane, associated wind intensity or rain can be overlaid on a map of the country to show areas which were directly impacted by the event. This facilitates easy targeting of relief intervention. Detailed analysis of impacted areas and their exposure to impacts of an event can also provide verification for assessment reports and insurance claims.
Assessment of structural damage to buildings, residences and physical infrastructure	For the past two years the National Emergency Response GIS Team (NERGIST) has used Geographic Information Systems and GPS to conduct IDAs. Specially trained teams of volunteers use GPS equipment to record the location and level of damage of buildings and residences (no significant damage, minor damage, major damage or destroyed). This information has been used to generate maps depicting levels of damage which inform the immediate recovery actions, the determination and prioritization of resource needs, and staffing decisions. Assessment information can also be assigned to parcel layers either in real-time or on return of the IDA team to the Emergency Operations Centre (EOC) to allow monitoring of areas that have been assessed. Knowing the exact locations of buildings and housing units that have major damage or have been destroyed is also useful in the reconstruction and recovery phase as it can aid in the determination of resource needs, housing grants, and the implementation of hazard mitigation programmes.
Visualization and sharing of damage information with key decision-makers in a timely manner	The ability to graphically present the extent of the impact of the event aids in quickly providing key decision-makers with an immediate impression of where the most severe damage has occurred. This also assists in the mobilization of disaster assistance funds and aid from funding agencies. This process can be further expedited with the use of WebGIS applications which can be accessed by multiple users via an internet browser.
Mapping and analysis of the occupancy levels of Hurricane Shelters – post disaster event	In 2011, the ODPEM developed a web-based GIS Shelter Management Application which facilitates the management of emergency shelters across the island. This information is critical in reporting on the nature of the response to the event.
Detection of change in the physical environment	Remote sensing data and techniques provided by GIS can be used for change detection. Satellite imagery showing before and after scenes of the affected area can be used to identify and assess the spatial dimensions of the damage and measure the impact of the disaster on the geographical environment. In the case of extreme flooding, satellite imagery can be timed to coincide with peak flood stages to map the extent of flood inundation. The flood extent maps can then be utilized to prioritize recovery efforts and to identify areas eligible for potential mitigation measures.

c. Spatial Data Requirements for Disaster Impact Assessment

In order to utilize GIS and other Geospatial technology, a variety of spatial data covering the elements at risk is required. Baseline data, of the status of these elements prior to a disaster is critical to the analysis of the impact of any event. Table 3 outlines some of the critical spatial data required for impact assessment.

Table 3. Primary Data Types Used in the Damage Assessment Process

Data Type	Required Information
Physical Elements Buildings Monuments and Cultural Heritage	Predominant type (e.g. residential, commercial, industrial) construction material, type of roof, building height, building age, total floor space, replacement costs, age of building or structure
Critical Facilities Emergency Shelters Schools Hospitals Fire Brigade Stations Police Stations	General Location of facilities, number of essential facilities, capacity, population served, individual building footprints
Transportation Facilities Roads Railways Public Transportation Routes Harbour Facilities Airport Facilities	General location of transportation facilities, general traffic density information, classification (main road, minor road etc), type of road surface
Life Lines Water Supply Waste Water Electricity Supply Communication	Location of detailed network of life lines facilities
Population	Density, distribution in space (parish, community, enumeration district), age distribution, gender distribution, disabled, daytime population, nighttime population, people per building, single parent households, low income groups
Economic Activities	Spatial distribution of economic activities, type of economic activities
Agriculture Data	By parish or community - Crop types, yield information, crop rotation, agricultural buildings, economic production import/export, type of economic activities, employment rate, poverty level, main income types
Environmental Elements Ecosystems Protected areas Natural Parks Forests Wetlands Aquifers Flora Fauna	Location of environmental elements, status
Administrative Boundaries Parish Community Enumeration Districts	Location, names, population

Source: Adapted from the Multi-Hazard Risk Assessment Guide Book, Van Westen, Alkema, Damen, Kerle, Kingma, 2010

The availability of accurate, timely and comprehensive baseline spatial data is not only critical for identifying secondary hazards and for planning response activities, but is also useful for comparison of before and after scenarios and strengthening the impact assessment process. A part of the preparation process for Impact assessment teams must, therefore, involve the development and integration of spatial databases long before the onset of any hazard event. The information outlined in Table 3 can be obtained from a multiplicity of sources including digital or hard copy maps, satellite imagery, aerial photographs, lidar and GNSS.

6. Establishing an audit trail

An audit trail refers to detailed information notations regarding the nature of the total effect of an event being investigated, the incidence and the estimated value of the damage and losses. An audit trail should include not only the data but its source, including names and dates of interviews with key informants/contacts and any assumptions made in arriving at estimations. Any formula used in the production of estimates should be noted in the audit trail as it is part of a meticulous approach to the derivation of estimates and should be available when a figure or a conclusion is challenged.

It is expected that the team of Assessors will establish an audit trail and should digitize the material collected so that it can be kept by the PIOJ for future reference. In order to best capture, organise and store data digitally that is collected during an assessment it is becoming the convention to have as part of the assessment team an IT person whose task it is to manage all data collected by the Team of Assessors.

7. Constraints to or Challenges in the Assessment process

- It is common for Assessors to find that there has been some **overestimation** of damage and loss and thus should be careful to verify data received
- Sometimes **data sharing and availability** can be a challenge. The best way to overcome such difficulty is through orientation and training of data managers about the important role of quantitative data to the success of the DaLA

- Affected communities can often suffer from **survey fatigue** especially where relief assistance is slow to follow. Honesty about the assessment process and the task of verification can be helpful, but to reduce such fatigue by the community, nothing beats capturing the information right on the first visit. Well trained Initial Disaster Assessors (IDAs) are essential.

- **Release of early information, that may not be wholly accurate**, by decision makers and others is never helpful, but deepening their understanding of the Assessment task and protocols can reduce such action

- The challenge of assessing **two events that occurred one after the other** (or two different types of events that occur concurrently) is never easy. If such occurs in one fiscal year, then the damage and loss for both events must be estimated and the overall effects presented. If the nature of the events are different such as a long period of drought (which had not been assessed) followed by flooding then the impact analysis should make clear what the economy and society had been experiencing as a result of the drought and currently, as a result of the damage and loss caused by the flooding

- **Double counting**, which occurs when damage and loss from one sector is picked up by another sector as well. This phenomenon can be reduced by open communication during the process within the team of Assessors and careful examination of the overall effects.

- Deciding on **the time line for use of data** by the DaLA. It must be remembered by the Assessors that the DaLA is a rapid assessment methodology with a start and end date. Data that comes to light after the end date cannot be included. Damage and Loss is assessed with regard to the fiscal year during which the event has occurred. The impact assessment of the event should take into consideration the projected time for recovery and reconstruction which may be from months to years.

Section IV

Estimating the Affected Population

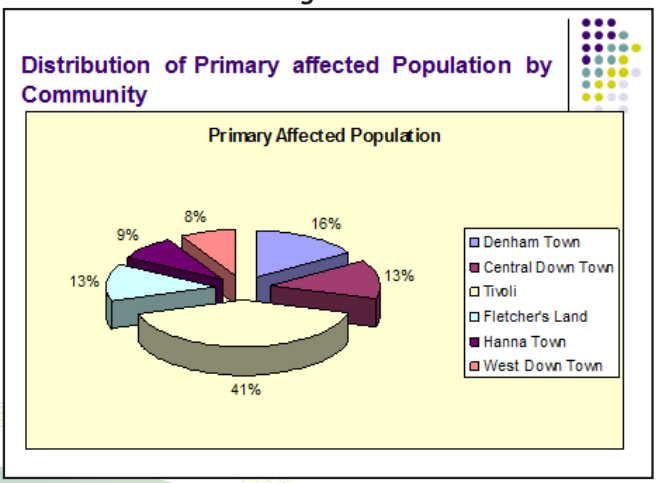
1. Defining[5] the Affected Population

As part of the estimation of the disaster effects (Damage and Losses), different types and degrees of population affected must be defined. These can be categorized[6] into the following groups:

- Primary affected: those persons living in the affected areas whose assets have been destroyed; who have lost their lives and who suffer injury or illness as a result of the event;
- Secondary affected: persons living in the affected area or outside of the affected area that have sustained losses in production and income;
- Tertiary affected: persons living outside of the affected areas that are sustaining higher costs of services (transport, water, sanitation and electricity) as a result of the event.

Each type of person affected will have different kinds of needs to achieve recovery and reconstruction following the disaster. *Figure 7* illustrates the distribution of the Primary affected population in the events in Western Kingston in May, 2010, by the Towns within the Western Kingston Parish.

Figure 7.



Source: Jamaica Report of the Macro Socio-Economic Effects of the Events in Western Kingston Area, May 22 - June 7 2010 pg.6

[5] *Adapted from the SIDS Manual, The ECLAC Handbook, and the GFDRR Training Materials*

[6] *Categorization has been adapted from SIDS Manual, ECLAC Handbook and GFDRR Training Materials*

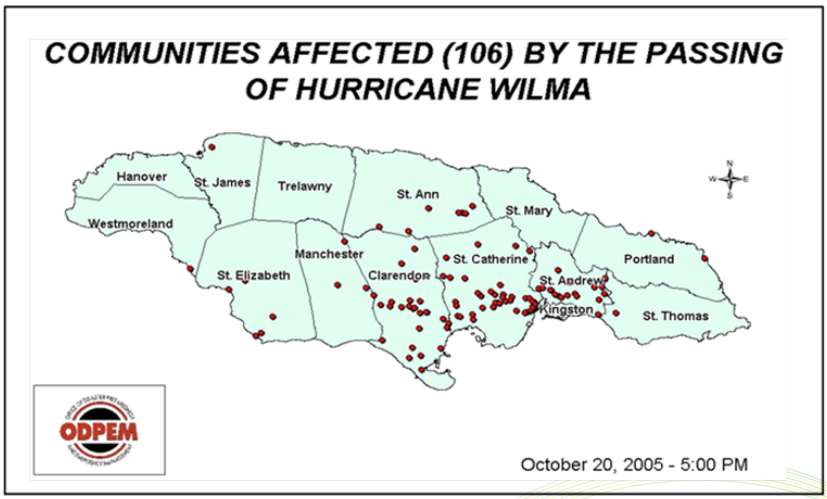
2. How do we estimate the affected population?

In order to estimate the affected population it is necessary to collect the baseline socio-demographic data for the affected administrative districts and the region or country as a whole. This data should be available in the latest Population and Housing Census, Survey of Living Conditions, Agricultural census or any other published data set of the government. The data should be collected and presented according to the essential socio-demographic characteristics of age, sex, religion, ethnicity and parishes.

The Assessors should then collect or estimate the data regarding the affected population seeking to maintain the same socio demographic characteristics as appearing in the baseline data. This data should be available through the ODPEM, the Health Sector, the Agricultural sector and any other entity such as the international Red Cross and Crescent organisation which provided relief or humanitarian assistance to affected persons.

Figure 8. illustrates the location of affected communities by the passage of Hurricane Wilma. It appeared in the Report on the Impact Assessment of Hurricane Wilma October 2005.

Figure 8.



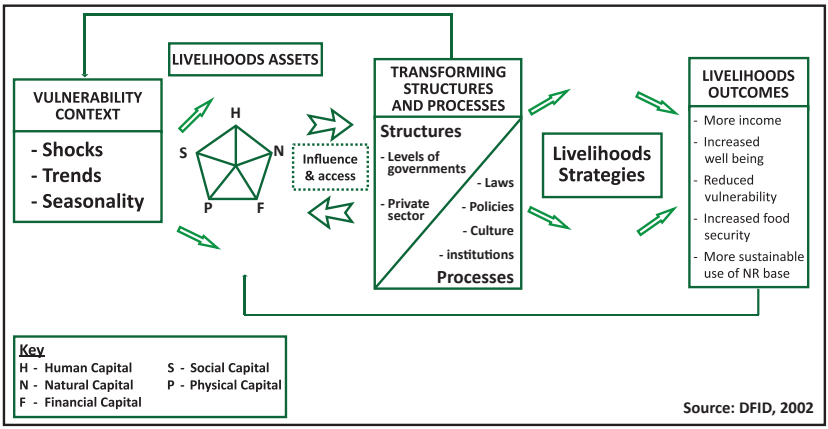
The data should be analysed not only according to the socio demographic characteristics but according to the administrative districts, thus allowing the policymakers to easily grasp where the most affected population reside, and what are their key socio demographic characteristics. GIS maps would be very helpful in this part of the report.

3. Consideration of Livelihoods Analysis

The key to a useful Livelihoods Analysis is sound data, rapidly collected, utilizing the Sustainable Livelihoods Approach (SLA) developed by the DFID and depicted in Box 1. The literature suggests that livelihood assets can play an important role in helping households and communities cope with the impacts of disasters. It is argued that the more assets people possess the less vulnerable they may be, as well as the greater the erosion of people's assets, the greater their insecurity and susceptibility.

In some circumstances, it may be useful to undertake a livelihood analysis as part of the assessment of the affected population[7]. Such an analysis has been found to be useful where significant poverty levels exist and persons are engaged in multiple livelihoods in order to sustain themselves and their households. It is important to note, that assets are not simply resources that people use to build livelihoods, but resources that give people capability to be and to act[8].

Box 1 . Schema for Sustainable Livelihoods Analysis



An essential component of the SLA is being able to report on the vulnerability context of the affected population. Jamaica's Community Profiles are a rich source of data for use in undertaking a vulnerability context.

[7] *Source: http://www.dfid.gov.uk/r4d/PDF/Outputs/Urbanisation/R7850_Majale_RGUU1_Review.pdf*
[8] *Amartya Sen on Livelihoods and Assets*

Box 2 provides a quick guideline to an investigation that could be used in the conduct of an SLA as part of the DaLA..

Box 2. Guidelines to Undertaking a rapid SLA as part of a DaLA[9]

1. Collection of Data on the households that were affected by the disaster in order to ascertain the extent of vulnerability of the population, through a comparative analysis with the national population. (Pre-disaster or pre impact situation)
   - Age of head of household
   - Sex of the head of the household
   - Number of children in the household
   - Family structure : nuclear, extended, single parent
   - Education levels
   - Health/well being
   - Elderly and persons living with disabilities
   - Their livelihoods/income streams
   - Their pattern of expenditures on essentials, i.e. food, clothing, education, health etc.

2. Collection of data on Livelihoods (Pre disaster situation)
   - What is the primary, secondary and tertiary income earning activity of the household
   - How many people in the household are involved in each activity
   - What do each of them do to contribute to the success of the activity
   - What proportion of time is spent on each activity

3. Assessment of Damage and Loss (post disaster situation)
   - Where are the affected communities located
   - Which households were affected (how many and to what extent)
   - What was the damage and losses suffered by each household with regard to their assets
   - How has each livelihood activity been affected by the recent disaster

4. Estimate the total effect on the affected community or communities
   - Aggregate all damage and losses by households, livelihoods and where data is available by sex

5. Examine data for a gender impact analysis
   - Are women the heads of households?
   - Do women do anything different in the household from men to contribute to household income?
   - What are their primary activities?
   - How have these activities been affected?

6. Make Recommendations for recovery and reconstruction
   - What will it take to get them back up and running?
   - How can we assist in building resilience and reducing future risk?
   - What will it take to make their livelihoods sustainable?

[9] *The Quick Guide has been adapted from the SIDS (Training Manuals)*

Section V

Estimating the Damage & Losses (Sector-by-Sector)

1. Generic Process

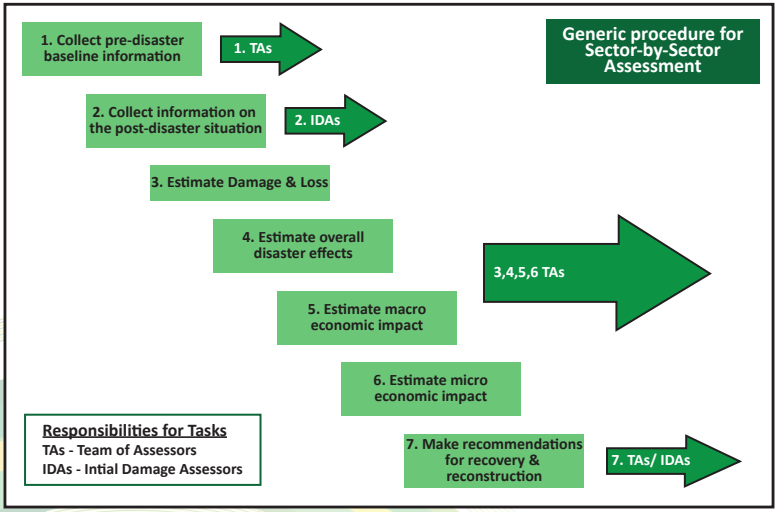
The methodology uses a ' bottom up' approach to gather information sector-by-sector in order to arrive at the overall effects of the disaster to the economy and the society. The data which is collected by the IDAs undertaken in each sector is essential to the success of the DaLA. The sectors are divided into the productive sectors and the social sectors. Infrastructure, which includes communications, transportation, water and sanitation, is treated as a separate sector.

The Productive Sector includes those parts of the economy through which income is earned either through local or foreign markets. The sub-sectors of the productive sector include but are not limited to: Agriculture, Commerce, Mining, Industry, Trade, Tourism and Services. Each sub-sector within the productive sector will have its own sub-sectors so Agriculture may have Crop, Livestock, Fishery and Forestry. Agro-industry may be captured as a sub-sector of Industry.

In the case of the Social sector, the sub-sectors include: Health, Education, Housing, Sports and Cultural Heritage. The Environment is treated as a cross cutting sector as are issues of Gender equity.

For each sector the approach is the same. The methodology requires the assessors to follow the basic procedure outlined in *Figure 9*.

Figure 9. Generic procedure for a step by step Sector-by-Sector Assessment



Source: Adapted from SIDS Manual and GFDRR#308

In **STEP ONE,** For each sector the Assessor must identify the official information that defines the situation in the sector before the disaster, called the baseline information. It has been suggested that the baseline information should provide information on the physical assets, the services provided, and the economic or social performance of the sector.

The information should include:

- Contribution of the sector to the GDP
- Contribution to employment
- Contribution to exports

This information may include, in the case of the crop sub-sector of the Agricultural sector, the levels of crop production by crop and region of the country. In the case of the Social Sector, such as the Health Sector, it would be important to understand what proportion of the health system is publicly owned and what is privately owned, the number of health facilities by region, the number of clients serviced and the manner in which the sector fits into the Government's development plans as may be articulated in Vision 2030. This information on the pre disaster situation can usually be sourced from existing published data.

In **STEP TWO**, based on field work undertaken directly by the Assessor or collected by others and verified by field visits, the Assessor will seek to capture information about the post disaster situation. Through interaction with local sector specialists (such as Agricultural Extension Officers in the case of the Agricultural Sector or CEO's of Telecommunications or Ports in the case of Infrastructure), a detailed picture of the effects of the disaster will be collected for analysis.

In the case of damage to existing assets, the extent of damage will be captured in physical terms and converted into monetary value. In the case of losses they will be represented in current monetary value.

In estimating damage and losses for each sector a comparison of the pre-disaster and post- disaster situation will be undertaken so that the effects of the event can be estimated in each sector and Parish and for the country as a whole.

In estimating the overall disaster effects, in **STEP THREE**, the Assessor is not only through aggregation, calculating the total effects, but seeking to understand how long it will take different sectors of the economy to perform at the level they were performing before the disaster and at what levels the various sectors will be able to perform until recovery and reconstruction can be achieved. In addition it is possible for the Assessor to indicate which sectors of the economy and geographic areas of the country were the hardest hit by the disaster. The Assessor is also exploring the intersectoral linkages to explain the unexpected and differential effect on various sectors and sub-sectors of the economy and society.

The conventional grouping and structure of the sectors to be assessed when using the DaLA are detailed in *Box 3*.

Box 3. Listing of Sectors and Sub-sectors.

Sectors:

- **Infrastructure**
  - Electricity
  - Water and Sanitation
  - Transport and Communication
- **Productive Sectors**
  - Agriculture
  - Livestock and Forestry
  - Industry
  - Tourism
  - Commerce
- **Social Sector**
  - Housing
  - Education
  - Health
  - Sport
  - Cultural Heritage
- **Cross Cutting Sectors**
  - Environment
  - Gender

Source: Adapted from ECLAC Manual and SIDS Handbook (Training Materials)

The actual productive sectors to be included in the assessment of damage and losses are those of the economic activities listed in the system of national accounts of the affected country. In the case of Jamaica the Productive Sectors are listed in *Box 4.*

Box 4. Classification of Industries

Productive Sectors listed by economic activities in the system of national accounts:

Agriculture, Forestry & Fishing
Mining & Quarrying
Manufacture
Electricity & Water Supply
Construction
Wholesale & Retail Trade; Repairs & Installation of Machinery
Hotels & Restaurants
Transport, Storage & Communication
Finance & Insurance Services
Real Estate, Renting & Business Activities
Producers of Government Services
Other Services

Source: Taken from the National Income and Product 2007. Published by The Statistical Institute of Jamaica. P42-43

For the purposes of the Handbook, the Damage and Loss Assessment focus will be placed on a selected set of sub-sectors of the productive and social sector, but in an actual assessment, all productive and social sectors should be examined.

2. Detailed process for the Productive Sector . The Example of the Agriculture Sector – Crop sub sector

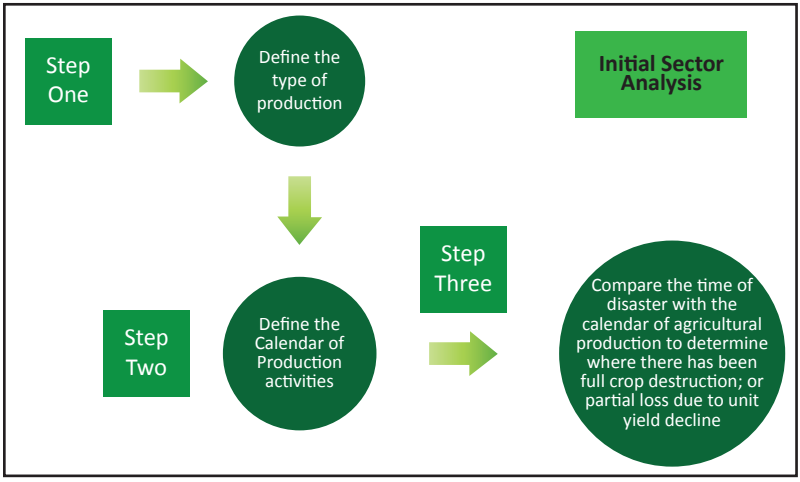
Agriculture has a number of its own sub-sectors such as Crops, Livestock, Fishing and Forestry, each of which must be assessed separately in order to capture all the damage and loss that has occurred as a result of the event to Agriculture.

Critical to note in the assessment of the Agricultural sub-sector is its seasonality, which may not exist in other productive sub-sectors[10]. Production may depend on climatic variation within a given year. Estimates of production losses will vary according to the season when a disaster occurs. Another characteristic of the Agricultural sector is that the sector may sustain losses without having damage to its assets as in the case of drought.

[10] *The tourism sector is an exception with its high and low seasons.*

In order to demonstrate the use of the methodology the crop sub-sector of the Agricultural sector will be presented. In undertaking the estimation of damage and losses in the crop sub-sector, the following steps can be taken, as outlined in Figure 10, when conducting the initial sector analysis.

Figure 10. Steps to be Taken in the Initial Sector Analysis of the Crop Sub-Sector of the Agricultural Sector.



Source: Adapted from the ECLAC Manual

Step Two requires the estimation of damage and loss, based on the data set provided and verified on the post disaster situation. *Box 5.* provides a list of items which one would consider in estimating damage and losses in the crop sub-sector. The task of the Assessor is to undertake a physical measurement of the assets that suffered damage due to the disaster and place a monetary value using pre disaster replacement costs. The losses are expressed in current monetary values.

Box 5. Identifying Damage and Losses in the Crop Sub-Sector

Source: GFDRR Training Material #305

Box 6. presents a quick guide to undertaking an assessment in the crop sub-sector of the Agricultural sector. The value of losses in the crop sub sector of the Agricultural sector can be estimated by the use of the simple formula presented in *Box 6.*[11]

Box 6. Quick Guide to Conducting the Pre and Post Disaster Assessment in the Crop Sub-Sector of the Agricultural Sector.

Crop-Sub Sector

First Step – Collect and present the pre-disaster baseline data for the affected Parish (or Parishes)

1. Investigate the type of crops produced, amount and value of crop production for each calendar year (3-5 year period).
2. Identify the surface areas that farmers planted with each type of seasonal and permanent crops.
3. Identify the average unit yields for each crop type defined on the basis of the type and quality of seeds to be used by farmers.
4. Ascertain the unit prices paid to producers for each crop: farm-gate, wholesale and retail levels of prices.
5. Identify the number of farmers involved in the crop production.

[11] *Formula sourced from DaLA Training Material. GFDRR #308 pg. 43*

Box 6 Cont.

Step Two – Collect information on the current post- disaster situation

6. Investigate the volume and type of crops produced, amount and value of expected crop production.
7. Investigate if the surface areas that farmers are planting have changed for each type of seasonal and permanent crops.
8. Define the anticipated average unit yields for each crop type on the basis of the type and quality of seeds to be used by farmers; investigate if any permanent plantations have been affected.
9. Have any irrigation/drainage systems been affected?
10. Have any storage facilities, and stored inputs/goods been affected?
11. Have any farm machinery/tools been affected?
12. Have any farm roads been affected?
13. Identify the production losses: Loss of full crop, decline in unit yield, higher production costs, more irrigation required, higher use of inputs, cost of re-planting.

Step Three – Estimate Damage and Losses

To calculate the Value of losses (VL) you can use the simple formula:

VL=C*(A-B)

A = Pre disaster forecast of production volume

B = Estimated volume of production after disaster

C = Pre disaster farm gate prices (using historical data)

VL = Value of losses

Source: Adapted from SIDS (Training Manual)

Table 4. is an example of the presentation of the estimates of damage to the domestic crop by parish, for an extreme event. From *Table 4.* one can understand how the data collected through the guide notes in box 6 should be presented.

Table 4. Preliminary Estimates of Damage to Domestic Crops by Parish

	Crops												
Parish	Legumes	Vege	Condi	Cereals	Fruits	Ground Prov	Plantain	Barra	Orchard	Others	Total hectare	Farmers	Total Value $M
St. Catherine	5	30	15	8	0	10	5	15	0	8	96	750	27
St. Andrew	20	15	10	5	0	20	25	0	4	2	101	1500	20
Portland	0	10	0	0	0	5	200	435	0	0	650	2500	93
St. Anns	9	60	11	16	0	3	5	7	0	0	111	1650	8
St. Mary	5	21	7	2	1	17	70	240	1	1	365	850	133
St. Thomas	14	22	8	0	5	4	90	40	0	2	185	1850	32
Clarendon	7	35	7	3	0	25	18	21	1	0	117	5100	71
St. Elizabeth	5	70	26	33	40	70	0	0	4	0	248	2700	25
Manchester	5	40	15	0	20	15	0	0	0	0	95	660	14
Hanover	7	15	5	5	0	30	90	80	2	0	234	900	30
Trelawny	0	10	0	0	0	0	5	5	0	0	20	800	5
St. James	0	30	14	4	0	20	50	350	1	3	472	1930	46
Westmoreland	5	8	5	8	0	7	28	15	7	0	83	1520	18
Total	82	366	123	84	66	226	586	1208	20	16	2777	22710	522

Source: Table 3.2 Report on the impact of Tropical Storm Gustav, 2008

Step Three is the estimation of the total effects of the event to the Agricultural sub-sector. Once the data has been collected for all the sub-sectors in the Agricultural sector, the total effect to the sector can be presented as in *Table 5*, which is taken from the impact of Hurricane Ivan on the Agricultural sector in 2004. The Assessor can also use the data to analyse which crops have suffered the greatest effect as a result of the event.

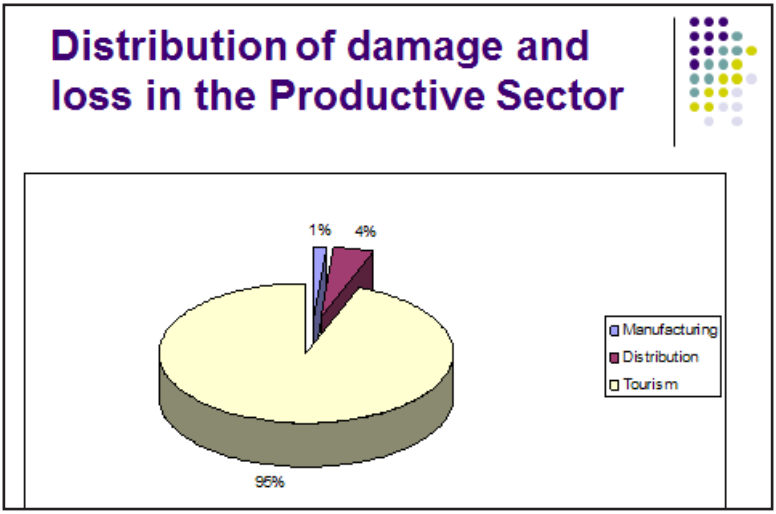
Table 5. Total Effect to the Agricultural Sector following Hurricane Ivan

Damage and Losses in the agriculture and livestock sector					
Millions of Jamaican dollars					
				Impacts on the external sector	
Sector and subsector	Total Effect	Damage	Losses	Increase in imports	Decrease in exports
Total	**8,550.1**	**3,407.00**	**5,143.00**	**440.00**	**2,784**
1. Agriculture	7,192.4	2,200.40	4,992.00	440	2,784
1.1 Domestic consumption	2,632.7	199.1	2,436.60	230	
Legumes	43.4		43.40		
Vegetables	396.4		396.40		
Condiments	142.7		142.70		
Fruits	111.3		111.30		
Cereals	76.8		76.80		
Bananas	522.0	120.4	401.60		
Plantains	341.0	78.7	262.30		
Ground provisions (Tubers)	570.6		570.60		
Tree Crops	416.5		416.50		
Others	12.2		12.20		
1.2 Traditional Exports production	4,559.7	2,001.30	2,558.40		2,784
Bananas	1,208.4	278.4	930.00		930
Coffee	1,760.5	992	768.50		769
Sugar cane	887.2	521.9	365.30		591
Cocoa	27.6		27.60		28
Pimento	351.0	209	142.00		142
Citrus	325.0		325.00		325
2. Livestock	758.6	607.6	151.00		
Broilers	366.5	366.5			
Layers	22.6	22.6			
Goats	149.5	149.5			
Cattle (beef)	28.0	28			
Cattle (dairy)	4.7	4.7			
Pigs	32.6	32.6			
Sheep	1.1	1.1			
Donkey	0.1	0.1			
Milk Production	26.0		26		
Colonies and honey production	127.6	2.6	125		
3. Fisheries	342.0	342		210	
Fisheries	306.0	306			
Aquaculture	36.0	36			
4. Infrastructure	257.0	257		175	
Agriculture	62.2	62.2			
Livestock	21.0	21			
Fishery	85.0	85			
Irrigation systems	88.9	89.9			

Source: Table 3.1 Report of Hurricane Ivan. 2004. "Reprinted from original table"

When all productive sectors have been assessed the Assessor is able to analyse, among other effects, the distribution of damage and losses within the sector, as is illustrated by *Figure 11* . This illustration is taken from the assessment undertaken following the events in Western Kingston.

Figure 11.



Source: Report of The Macro Socio-Economic Effects of the Events in Western Kingston Area, 2010

3. Detailed process for the Social Sector . The Example of the Housing Sector

Experience suggests that Housing is one of the most affected sectors, whether caused by Hurricanes or Earthquake. The standard definition of what constitutes housing is drawn from the Population and Housing Census. Housing units are defined as "every building destined to shelter persons or families for purposes of habitation". It does not include urban infrastructure or construction equipment, as these are included in the infrastructure component of the assessment.

When undertaking an assessment of the Housing sector, the Assessor should continue to follow the standard methodology for undertaking the DaLA, and that is, the collection and preparation of the baseline information about the sector.

The characteristics of the sector should be detailed with regard to:

- public and private ownership,
- size of housing stock,
- extent of insurance coverage,
- age and quality of housing stock and
- type of construction materials used.

Through the Population and Housing Census, it is possible to ascertain the proportion of households that are involved in rental and those in mortgages. Other sources of baseline information would be the Survey of Living Conditions.

The Assessor collects the data base of the post-disaster situation, compiled by the IDAs, which should provide details of the damage suffered. Initially the information should be provided in units of measurement and then converted to monetary value. Using information gathered from the pre-disaster situation the assessor will estimate the value of losses for the post-disaster situation. *Box 7.* presents a guide to the categorization of damage and losses in the Housing sector.

Box 7. Categorization of Damage and Losses to Housing Sector

Damage	Losses
Value of totally destroyed or partially damaged houses	Loss of income from rent
Value of furniture destroyed or damaged	Cost of relocation
	Cost of demolition and removal of debris

Source: Adapted from SIDS (Training Manual)

The Assessor should be able to assess the need for temporary housing and be able to put a value to the magnitude of housing required and the length of time that such temporary facilities would be required. *Box 8* presents a quick guide to the conduct of an assessment in the housing sector. It should be noted that during an extreme event individuals and households may lose many personal effects that to them are irreplaceable and which cannot be economically quantified. The Assessor can report on the social burden which such losses place on the affected communities.

Box 8. Quick Guide to Conducting the Pre and Post Disaster Assessment in the Housing Sector

First Step – Collect and present the pre-disaster baseline data for the Parish/Parishes

1. The number of Households
2. Number privately and publicly owned
3. The quality of housing
4. Different type of houses in the Parish
5. The materials of construction
6. The proportion of rental to owner occupied homes
7. Proportion of Mortgaged Homes
8. Proportion of insurance coverage
9. The income status of householders
10. The sex of heads of households

Step Two – Collect information on the current post- disaster situation

1. Total number of houses totally destroyed
2. The number partially destroyed and the level of damage suffered;
3. The districts in which they are located;
4. The number that are publicly owned or privately owned;
5. Total number requiring repair;
6. Total number of houses requiring reconstruction
7. The proportion of dwelling units in the affected areas in relation to the national stock
8. The unit value of construction costs

Step Three - Estimate damage and losses

Source: Adapted from ECLAC Handbook, SIDS Manual and GFDRR training manual

Table 6. presents comparative data for the pre-disaster situation and the post-disaster situation in the Housing sub-sector of the social sector as part of the assessment following Hurricane Ivan.

Table 6. Households affected by Hurricane Ivan (2004)

Parish	Estimated HHs 2004	Affected HHs assessed	Proportion of HHs affected	Affected HHs processed	HHs totally destroyed	HHs Severely damaged	HHs Suffering Minor damage
Kingston & St. Andrew	177436	8710	0.09	5789	526	4532	731
St Thomas	25205	5836	0.06	3744	318	2580	846
Portland	22028	3100	0.03	1987	130	1324	533
St Mary	30481	6604	0.07	4716	353	3397	966
St Ann	46040	5470	0.05	3515	211	2774	530
Trelawny	19919	1155	0.01	364	56	284	24
St James	48221	6110	0.06	3321	288	2712	321
Hanover	18186	5502	0.06	4374	475	3433	466
Westmoreland	38194	11474	0.11	4334	443	3162	729
St Elizabeth	39891	12068	0.12	5922	414	4277	1231
Manchester	51497	7599	0.08	5436	458	4224	754
Clarendon	65442	19217	0.19	11739	1298	9537	904
St Catherine	131395	7070	0.07	6190	654	4735	801
Total	713935	99915	1.00	61431	5624	46971	8836

Source: Table 2.1 Report of the Assessment of Hurrican Ivan .2004 pg. 8

Table 7. presents an example of the presentation of the total effects on the housing sub sector, using data from the impact of Hurricane Ivan (2004) including the estimated cost of reconstruction and the imported component.

Table 7.
Damage and Losses Caused by Hurricane Ivan on the Housing Sector of Jamaica

(Million Jamaican Dollars)

	Damage and losses			Reconstruction costs	Imported component
	Total	Damage	Losses		
Total	**11,163.3**	**10,474.2**	**689.1**	**13,998.6**	**3,666.0**
Dwellings	9,151.1	9,151.1			3,202.9
House furnishings	1,323.1	1,323.1			463.1
Removal of debris	89.1		89.1		
Relocation costs	600.0		600.0		

Source: Table2.2 Assessment report of Hurricane Ivan 2004. Pg 10

4. The Environment

Natural capital is part of the assets of a country. Negative environmental changes affect the flow of environmental goods and services and therefore may cause economic and or social losses. In addition natural ecosystems play a key role in damage mitigation of extreme events.

The approach of the DaLA methodology is to consider the environment as an economic asset, part of the natural capital that provides goods and services. Goods in the form of food, fibers, genetic resources, water, energy; and services in the form of biodiversity, conservation, water cycle regulation, capturing and storage of carbon, aesthetic beauty and opportunities for recreation for tourists and locals alike.

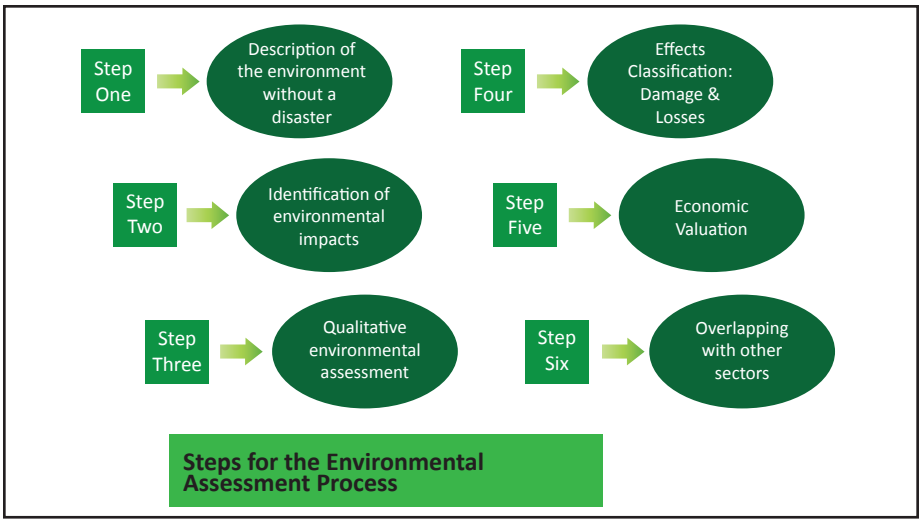
Treating with the environment as an economic asset has not always been an easy task as specific baseline data on the environment is too often unavailable and preliminary but necessary surveys have not been undertaken. This situation should be changing however, as more technocrats receive training in Natural Resource Valuation[12].

Nevertheless, by including environmental damage in the assessment, it allows policymakers to establish relationships between damage magnitude and previous environmental degradation and highlight the importance of environmental protection as a strategy for disaster reduction. It also allows consideration of environmental restoration among the investment alternatives in the post disaster situation.

[12] *Natural resource valuation techniques address the economics of the monetary valuation of natural resources. For further readings on natural resource valuation, see Natural Resource Valuation: A Primer on Concepts and Techniques. 1997. C.A. Ulibarri & K.F. Wellman.*

Figure 12. presents a quick guide to the environmental assessment process & *Box 8* a guide to the categorization of damage and losses in the environment.

Figure 12. Environmental Assessment Process



Source: Adapted from the SIDS (Training Materials)

Box 9. Guide to Categorization of Damage and Losses to the Environment

Damage	Losses
Damage to the Environmental or Constructed capital leading to prevention or use of environmental assets 1. **Breakdown of water networks** 2. **Destruction of roads to tourist areas** 3. **Destruction of fish equipment**	**Drop in tourist income due to changes in the conditions of natural assets and /or related infrastructure** **Incremental costs due to the use of bottled water**
Changes in the quality or quantity of the environmental asset: 1. **Quality loss of drinking water** 2. **Air pollution** 3. **Change in Sea Temperature** 4. **Lossof mangroves** 5. **Loss of seabed** 6. **Erosion of beaches**	

Source: Adapted from the SIDS (Training Materials)

It is important for Assessors to acknowledge that it is not always possible to estimate the economic value of aspects of either damage or loss to the environment, as many values are still not known. In addition because the DaLA is a rapid assessment methodology, time may not permit for procedures

such as contingent valuation, that may require survey methodologies to be undertaken that could result in reliable values.

What often obtains in the environmental sector is that many instances of valuation have been captured in other sectors of the assessment, such as forest roads and trails may have been captured by Infrastructure or Forestry. It is incumbent on the environmental sector specialists to liaise with other team members to avoid double counting.

5. Overall Effect

When all sector assessments (productive, social and infrastructure) have been completed, a summary table should be produced. Such an example appears as *Table 8*, which then allows for the overall effects to be explained and the following impact analysis to take place.

During the examination of the overall effects of the event, the Assessors should also make clear the effect of the event, evident due to inter-sectoral linkages within the productive sector and across sub-sectors, either forward or backward. Such linkages may explain a stronger or weaker effect on the overall economy and society than what was initially considered through the examination of an affected sector or sub-sector alone. The collaboration and input of sector specialists during the estimation of the damage and loss to their sector and sub-sectors and in the explanation of the overall effects, proves to be very helpful.

As an example, we may look at what appears to be unexplained loss in the industrial sector. Sector specialists can explain that damage and loss in the agricultural sector (crop sub-sector) may impact the industrial sector as the inputs key to some industrial outputs may have suffered damage. Thus persons employed in the Agro-industrial sector may lose jobs or be laid off until such time as the necessary input can be produced locally or sourced externally. The industrial sector therefore, which may not have suffered any damage due to the event, may suffer losses as a result of the damage and loss to the agricultural sector.

Another example can be drawn from the health sector. Damage and loss to the agricultural sector may affect the health and nutrition status of the population or some segment, such as that of breast feeding mothers. This may require the health sector to provide additional health supplements to safeguard the nutritional status of the mother and child to come , thus increasing their costs and making losses appear in the health sector, where none were expected.

Table 8.

Summary of Damage and Losses caused by Hurricane Ivan in Jamaica

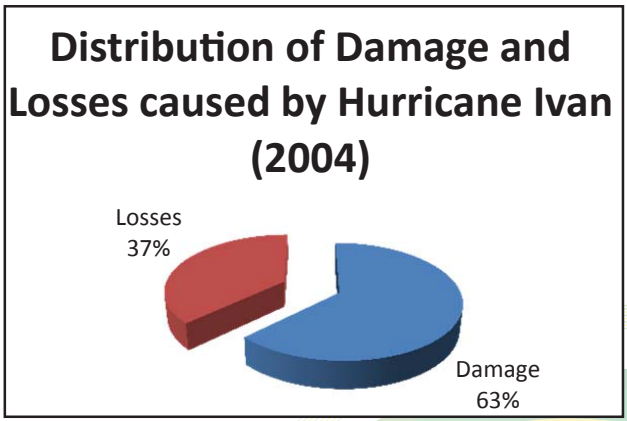
(Million Jamaican Dollars)

Sector and subsector	Damage and losses			Sector	
	Total effect	Damage	Losses	Public	Private
Total	**36,886.3**	**23,182.2**	**13,704.1**	**9,605.8**	**27,180.5**
Social sectors	13,684.6	12,943.3	741.3	2,520.7	11,163.9
- Housing	11,163.9	10,474.8	689.1		11,163.9
- Education and culture	806.9	794.9	12.0	806.9	
- Health	758.4	718.2	40.2	758.4	
- Public buildings	955.4	955.4		955.4	
Productive sectors	13,375.6	4,133.3	9,242.3	312.1	13,063.5
- Agriculture and livestock	8,550.0	3,407.0	5,143.0		8,550.0
- Food processing	2,204.9	210.0	1,994.9	312.1	1,892.8
- Mining	1,030.0	50.0	980.0		1,030.0
- Tourism	1,590.7	466.3	1,124.4		1,590.7
Infrastructure	6,987.9	3,545.0	3,442.9	4,117.5	2,770.4
- Electricity	1,397.9	589.0	808.9	279.6	1,118.3
- Water supply and sanitation	678.7	190.4	488.3	578.7	
- Transport	3,255.9	2,460.0	795.9	3,199.1	56.8
- Telecommunications	1,535.3	198.6	1,336.7		1,535.3
- Airports	120.1	107.0	13.1	60.1	60.0
Environment[13]	2,560.6	2,560.6	...	2,560.6	
Emergency expenditures	277.6	---	277.6	94.9	182.7

Source: Table 6-1 Report of the Assessment of Hurricane Ivan.2004 pg 52

It is possible as illustrated by *Figure 13*, for the Assessor to use the data from the summary table to analyse the distribution of the effect of the event. In this instance the distribution of damage and losses caused by Hurricane Ivan is presented.

Figure 13.



[13] *To avoid double counting, damage to assets already accounted for in other sectors are not included in this figure.*

Section VI
Impact Analysis

1. General Comments

Having quantified the total effects of damage and losses in each sector, and determined the overall or total effect, the Assessors should proceed with the analysis of the impact of the disaster at different levels. The impact analysis should be undertaken at the macro-economic and micro-economic level. It should also embrace an analysis of the impact on social development including gender equity.

The impact analysis follows a similar process to the methodology demands for the sector by sector assessment, in that one begins with a description of the situation before the disaster. Through an examination and presentation of data on past performance, and the data regarding the effects of the disaster as determined by the DaLA, the Assessor presents the projections of what the likely impact of the event would be on the economy and the society.

2. Impact analysis at the Macro-Economic Level

In the case of the macro-economic analysis, the losses which have been estimated at the sector level can be used in the calculation of the impact on overall economic performance, in terms of possible changes in the growth of GDP. The losses can also allow for the estimation of changes in the balance of payments and trade, as well as the fiscal position of the affected country.

In the case of the macro economic impact analysis, the most important sources of information for this pre-disaster situation analysis are: projections on economic growth, the fiscal budget, periodic revised estimates of expenditure and other supplementary documents or information that may be available.

The Assessor should seek to identify actions and events carried out during the emergency that can have an effect on macro-economic aggregates. Once this has been completed, an examination of the post-disaster situation is undertaken. The Assessor can focus his/her attention on the following key macro-economic variables for examination: Change in Gross Domestic Product (GDP); Impact on Balance of Payment (BOP) and Impact on Fiscal Budget.

A. Impact on GDP

Disasters generally result in an overall decline in GDP growth, particularly in the year of the disaster and an increase in construction sector GDP, due to the implementation of reconstruction programme.

The effects on economic growth can be estimated at the global and sectoral level. The Assessor will estimate the post disaster value and growth rate of overall and sectoral GDP at the projected growth rate and compare these results with the pre or non-disaster forecasts to get the impact of the disaster on economic performance.

The process involved in undertaking a valuation of the disaster on GDP is as follows:

a) Obtain an estimate of GDP for the previous year before the occurrence of the disaster. This is the basic GDP forecast that governments and Central Banks estimate and is available in their statistical digest. A time series of three to five years prior to the disaster would be useful and would allow for a trend analysis.

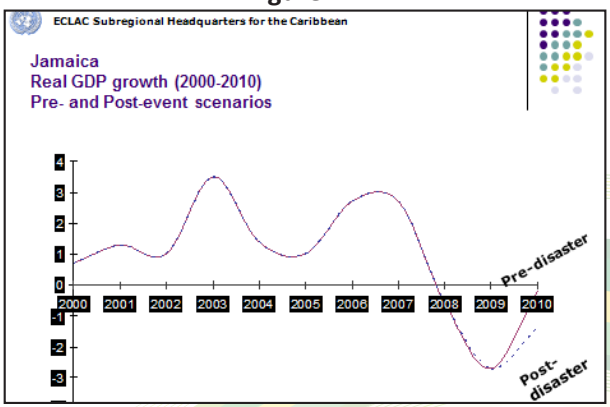
b) Obtain an estimate of the GDP losses as a result of the disaster in constant prices. These losses should include decreases in production during the period of recovery and reconstruction. This is taken from the Losses estimated in the DaLA.

c) Subtract the estimated losses from the GDP that was estimated before the disaster.

The estimation of future growth scenarios should also be considered. The starting point is the estimation of GDP, taking into account the effects of the disaster. The scenarios will then take into account the reconstruction costs, reconstruction priorities (sector by sector), and in general, reconstruction strategies.

Figure 14. illustrates the fall in growth that may occur as a result of the event. This illustration was taken from the draft preliminary estimates following the event in Western Kingston (2010).

Figure 14.



B. Impact on Balance of Payments

When we speak of Balance of Payments (BOP) we are usually referring to imports and exports on goods and services, foreign financial flows (foreign direct investment, portfolio flows), official aid and international reserves.

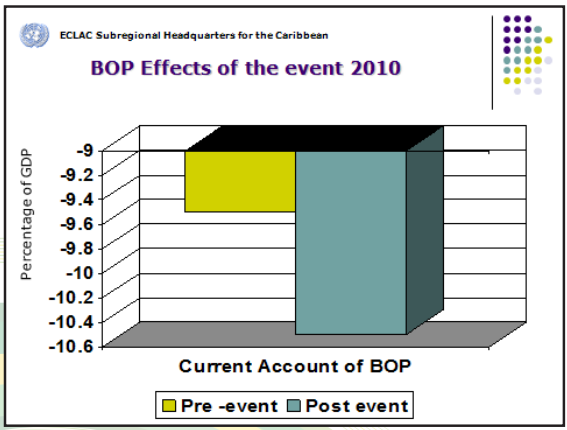
The impact on the BOP is usually negative following a disaster. The extent of the impact depends on the severity and duration of the disaster. Typically, a disaster results in an increase in imports (for food stuff and other products) to compensate for losses in domestic production, stocks and new needs arising out of the disaster. An economy may experience a decrease in exports and other foreign exchange earning activities.

In order to conduct an estimation of the effects of the disaster on the BOP the data required are: an estimation for the balance of payments for the year in which the disaster occurs prior to the event; a time series for the balance of payment accounts for the past three to five years; the balance of payment accounts should be as detailed as possible.

In estimating the effects on the BOP, the Assessor should examine the effects on the three key components of the BOP, the flows of goods and services in and out of the country; the unilateral transfers that are the counterpart of real resources or financial claims that are provided or received (such as remittances); and the changes in resident's claims on, and liabilities to, non-residents that arise from economic transactions.

Figure 15. illustrates the effects of the event of 2010 on the Balance of Payments. It is taken from the draft preliminary estimates of that assessment.

Figure 15.



C. Impact on Fiscal Budget

A natural disaster affects the budget. The budget is a financial programming exercise presenting how the government plans to spend revenue. It presents certain expected level of receipts and certain expected level of expenditures. Following a disaster, it is expected that there would be an overall increase in the fiscal deficit.

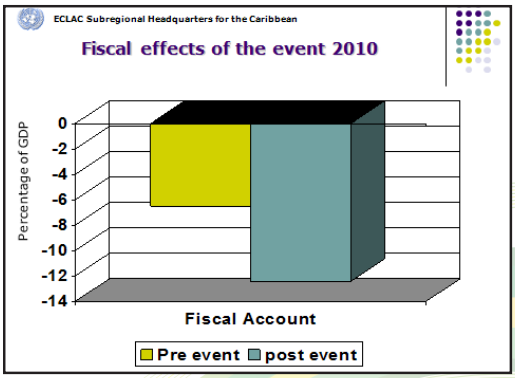
There are a number of possible budgetary effects due to the disaster. There could be a reduction in current revenues due to decreases in: tax revenues and non-tax revenues; reduction in capital revenues due to destruction and damage; variations (probable increase) in current (operating) expenditures; increases in operating outlays; increases in transfers; and decreases of interest on public debt.

To undertake the estimation of the impact of the event on the fiscal budget the Assessor should:

1. Use pre-disaster projection of fiscal budget position for the current and subsequent years;
2. Adjust with government losses from the sector-by-sector assessment in revenues and increases in expenditures (avoiding duplication or double counting);
3. Estimate the post –disaster performance of the government budget;
4. Compare the results with the pre-non disaster forecasts, to identify the impact of the disaster on fiscal performance[14].

Figure 16. illustrates the changes that may occur following the event in Western Kingston 2010. It suggests that there will be an increased deficit in the fiscal accounts as a result of the event. The chart is take from the draft preliminary estimates prepared following the event in Western Kingston.

Figure 16.



[14] *Source: DaLA training material #308. GFDRR*

3. Impact at the Micro-economic level and on Social Development

A. General Comments

The impact analysis at the micro-economic level and on Social Development involves the examination of the outcome of the event on the well being of the population affected by the disaster.

Experience has taught that ordinary people may suffer tremendous hardship following a disaster. It may be through loss of life, loss of loved ones, injury or loss of personal property or livelihoods. The loss may be severe or moderate. It may be of a temporary nature or for a sustained period of time. The extent of the impact on individuals and households is based on multi-dimensional factors which should take into account the susceptibility and resilience of the affected person or household.

Simplified indicators of the extent of hardship which an extreme event may cause to individuals or households, that through practice, the DaLA allows us to capture, are increased cost of living and decline in livelihoods, resulting in a decline in personal or household income. These combined factors may allow the Assessor to determine increased poverty levels in the areas affected by the disaster. In the case of Jamaica, where Surveys of Living Conditions are consistent and reliable, best use should be made of the data to ascertain if poverty levels have changed and for which geographic areas and for what likely period of time.

The Assessor should seek to determine the extent to which these micro level factors, together with the total effect to the social sector and productive sector, causes distress to the country's capacity to achieve its stated social development goals.

B. Employment, Unemployment and Income Loss

Disasters affect different segments of a society differently. While some people may be disadvantaged due to disruptions caused by an event, others may be advantaged, or may suffer no loss, as their status remains the same. Some may find themselves without jobs due to damage caused by an event to the sector in which they are employed and others may have additional work as reconstruction efforts get underway in the same or another sector. The situation of advantage and disadvantage may be apparent between men and women or between any group of workers employed in the same or different economic sectors or living in different geographic locations of the country.

Often salaried or permanent employees may not lose income but casual employees or own account workers may lose income. The situation of persons engaged in the informal sector should be considered. Where baseline data is available about such persons it should be considered and rapid assessment methodologies should be designed to capture information about their post-disaster situation so that they too can be included in the impact analysis.

It is the task of the Assessor to report on the impact of the event on the employment status of the population, by sector, geographic/administrative districts, by sex and age groups if the data allows. As the methodology mandates, this assessment begins with the baseline labour force data for affected sectors.

The Assessor should also seek to calculate the extent of income loss that will occur as a result of the disaster, sector by sector and for men and women.

This can be undertaken through an examination of data for gross production/output and number of workers and average wages. This data should be available from the Statistical Institute of Jamaica (STATIN) and captured in National Accounts, Population and Household Census, Household Surveys, and Establishment Surveys. Once this is known, then the value of production losses which were captured in the estimation of damage and loss, for all sectors can be used to estimate the corresponding expected reduction in personal and household income in each of the sectors that was affected.

The method involves the calculation of the ratio between post-disaster losses and regular gross output/production and the estimation of the value of income decline for each affected geographical area over the entire recovery period, sector by sector and for men and women, if disaggregated data is available.

Box 10. presents an example of a work sheet which estimates the value of Personal income decline over the period of an event and during the projected recovery. The data from the impact of Hurricane Ivan on the Agricultural Sector is used.

Box 10.

Example of Wages Lost in the Agricultural Sector as an impact of Hurricane Ivan in 2004	**2004**
Gross output (Million J$)	25,196.5
Production losses (Million J$)	5,143.0
Ratio of Production Lost	0.204
Number of Workers	226,800
Number of Work years lost	0.046
Average annual wage income (Million J$)	10,813.0
Imputed and self-employed wages lost (Million J$)	**497.4**

This estimation process[15] is explained by the following:

- The Gross Output is taken from the National Accounts
- The Production losses are found in the estimates made in the DaLA
- The Ratio of Production lost = production losses / by Gross output
- The Number of work years lost = the number of employed persons* ratio of production lost
- The Value of income lost (imputed and self-employed wage lost) = value of wage*number of work months (years) lost

C. Exacerbation of Poverty

Often following an extreme event, people who have been vulnerable or living just above the poverty line will slip below the line, temporarily or permanently.

The Assessor would seek to estimate the number of persons or households that may have fallen under the poverty line as a result of the disaster. To do so, the Assessor would have to collect the data from the most recent Survey of Living Conditions, Household Survey or Country Poverty Assessment. As in the manner of the methodology, this data set would be used as the pre-disaster baseline. Through that data set, the Assessor would be able to determine the number and location of people living below the poverty level in the affected country or area before the event.

[15] *The process is explained in GFDRR DaLA Training Material #308 pg117 -119*

A GIS generated map would be most useful to present this data.

From the previous estimates of income decline, and using the country poverty line as the benchmark, the Assessor could estimate the additional number of persons that will fall under income poverty due to the disaster. This information could be presented by administrative district, economic sector and sex.

The Assessor should be able to determine based on other measurements of poverty such as food availability or security, conditions of housing, or access to pipe borne water, if the disaster would have worsened conditions of living for more people, thus increasing their vulnerability and/or poverty.

Goal 1 of the Millennium Development Goal (MDGs) calls on governments to halve by 2015 the proportion of people living on less than one dollar per day. It has been suggested that for the Caribbean to meet the first target of MDG-1, it should reduce the Head Count measure of the incidence of poverty by 10%-18% by 2015[16]. It would be important for the Assessor to ascertain how the event will affect the possibilities of the country meeting its goal.

D. Impact on Productivity

The importance of productivity to economic growth and development and ultimately, the well being of people, is well recognized[17]. There is sufficient evidence to support the notion that extreme events have a negative impact on a country's development, as it disrupts production and the productivity of labour and capital. How such events affect productivity may also be analysed. Is there a differing productivity effect based on the nature of the event? There are many questions which an impact analysis of an extreme event on a country's productivity or on a sector of the economy or a geographical area of a country, may be answered depending on the availability of data.

Productivity is a measure of the rate at which goods and services are produced and expresses a quantitative or qualitative relationship between output and input. Productivity can be further defined as the arithmetic ratio between the amount produced and the amount of any resources used in the course of production. The usual definition of productivity is actually what is known as a partial factor measure of productivity, in the sense that it only considers a single input (usually labour) in the ratio.

[16] *Regional Report on the achievement of the MDGs in the Caribbean Community. UNDP 2004*

[17] *Jamaica: Productivity Summary Report 1972 - 2007. Jamaica Productivity Centre.*

Both economists and statisticians agree that measuring productivity is not an easy task, which is often compared to measuring an intangible. Despite its difficulty, productivity measures are fairly sound gauges of effective resource use. In the context of a damage and loss estimate following an extreme event, we are speaking of how the event affected the use of the human resource. In measuring labour productivity, the GDP is usually used in the equation representing output while labour-based hours of work, because of its ease of availability, is the frequently used input variable. The rate of productivity is simply stated as: Productivity = GDP/input.

It is possible as part of the impact analysis, for the Assessor to examine the impact of an event on the rate of productivity of a country[18]. By using the rate of productivity for the previous year or the average annual rate over a period of three to five years, and the estimated rate of productivity for the year in which the event occurs (developed through the DaLA) it would be possible to calculate the change in productivity as a result of the event.

The formula would be expressed as follows:

PP = (A- B /B)
Where PP = percentage change in productivity

A = Estimated Productivity (EP) rate for the Present year (the year in which the event occurred)

Formulated as:

EP = GDP (as estimated in the DaLA for the year in which the event occurred)/ input (Hours worked)

B = Annual Productivity rate for Previous year

The example is drawn from the Report on the Event in Western Kingston and is presented in *Box 11*. It suggests that although the labour productivity appeared to be higher than the preceding year, the effect of the event actually affected labour productivity negatively, as there was a decrease in the rise of productivity over the preceding period.

Box 11.

Example of Change in Productivity as a result of the Event in Western Kingston 2010	
Estimated GDP for 2010 ($J millions) [a]	**1069,023**
Hours Worked (Total Economy and Industry) 2010 [b]	2330599700
Estimated Productivity for 2010 [c]	0.000459
Annual Labour productivity (Output per hour worked) -2009 [d]	0.000449
Estimated Change in Productivity (PP) [e]	0.021176

[18] *Where adequate data is available, econometric techniques could be used to determine estimates of the impact on capital and even total factor productivity.*

Notes: a. Estimates based on DaLA from the event in Western Kingston 2010
b. Jamaica Productivity Centre
c. Estimated using the formula P= GDP/input
d. Calculated from data from the Jamaica Productivity Centre
e. Estimated using the formula PP=(A-B)/B

E. Social Development Analysis

The Assessor should examine the results of the social sector damage and loss, the productive sector results and the overall effects of the disaster to undertake an impact analysis of the event on the social development potential of the country.

Taking into account the results of the analysis at the macro-and micro levels, the Assessor should address the impact of the event on, the goals articulated in Vision 2030-National Development Plan - the country's HDI (Human Development Index) and if HDI's exist for different Parishes, and the MDGs. With regard to the MDGs, of particular interest to Jamaica, would be goal one which has been discussed in section C on the exacerbation of poverty and goal seven. Special attention can be paid to target 7C and D which speak to issues of safe drinking water and improvement in the lives of slum dwellers.

Social scenarios should be developed which suggest how long and under what conditions the country may be able to get back on stream. They should also explain how the setbacks to the productive and social sectors may constrain the country from being able to meet its stated development goals as articulated in its National Development Plan -Vision 2030 and related international development agreements such as the MDGs.

4. Ensuring a Gender Analysis as part of the impact analysis

Gender Analysis is a process that helps to assess the differential impact of development policies and programmes, or extreme events on groups of males and females. Gender analysis of sex disaggregated data is the tool which is used in the process, and acts as a guide to interventions that promote gender equality and equity (fairness).

Experience suggests that disasters have a differential impact on girls and boys and men and women. *Box 12* details examples of such differentials. It is the task of the Assessor to make clear the differential impact of the event on men and women so that policies and programmes for recovery and reconstruction can enable the best use of human resources and at the same time promote gender equity. Applying gender analysis as part of the impact analysis should ensure that no groups are unduly disadvantaged over another.

To undertake a rigorous gender impact assessment, the Assessor must seek to have all data collected at the sector level disaggregated by sex and age. This should obtain for both the pre and post disaster baseline data sets. The Assessor must be able to design and conduct gender based research, as part of the rapid assessment methodologies where data gaps exist. The research should seek to deepen the understanding of the differential vulnerability and/or impact of disasters on women and men , girls and boys through quantitative surveys, where those are possible, or qualitative research, such as focus groups, thus enriching the impact analysis for policymakers.

Box 12. Differential Impact of Disaster on Men and Women

Issues	Female	Male
Pre Disaster Differing Vulnerabilities - biological - social - cultural - attitudinal (risk perception)	Reproductive health needs Restricted skill base Exclusion from home construction Low level of risk tolerance	No special restrictions Mobile skills Exclusion from child care responsibilities High level of risk tolerance
Emergency Differing coping mechanisms	Suffer higher incidence of depression (crying and suicidal ideation); Organizing community sing-a-longs and story telling;	Alcoholism, gambling and dysfunctional behaviour; Rescuing villagers and clearing roads;
Transition (rehabilitation and recovery	Weak access to wage earning possibilities; Women prepared one-pot meals for the community; Devoted more time to community and reproductive work.	Easier access to wages/income; Men engaged in "marooning" teams for house rebuilding; Spend more time in productive work; abandonment of families
Reconstruction Differing priorities Differing access to resources; Differing access to power in the public sphere	Priorities for shelter, economic activity, food security, and health care; Women slower to return to Labour Market; Reconstruction programmes that embark on development without the inclusion of gender analysis tools; Women's lack of involvement in governance mechanisms.	Priorities for agriculture, Infrastructural development and economic activity; Men easy access to the Labour Market; Reconstruction programmes in construction and agricultural development that favour male participation; Gender neutral governance mechanisms that don't recognize changing gender roles and relationships, and favour male participation.

Source: Adapted from the Gender Impact Assessment of Hurricane Ivan in Grenada: Making the invisible, visible.

Section VII

Making Recommendations for Recovery and Reconstruction

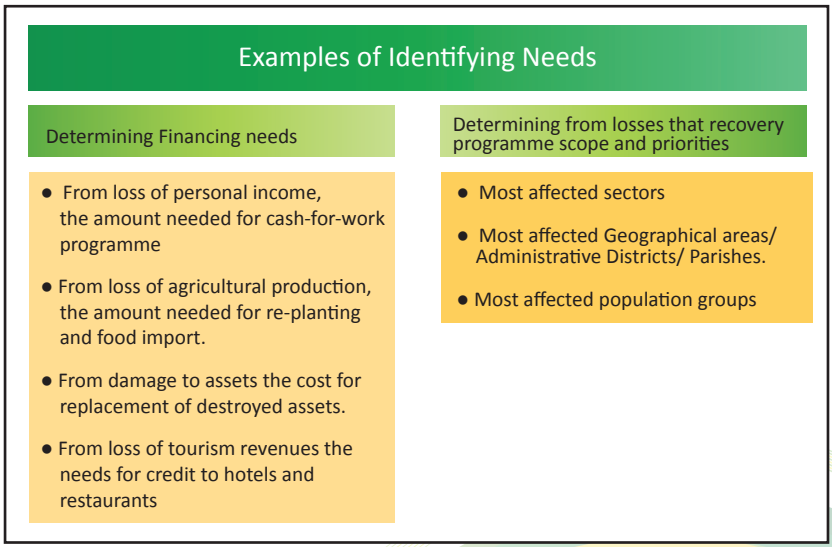
1. The use of damage and loss estimates

The Assessor can use the damage and loss estimates to identify the areas and sectors that require financial assistance and to estimate the quantity of the assistance required. Financial needs for each sector and sub-sector can be estimated from the value of estimated losses.

The comparison of estimated losses to sector GDP provides a measure of the impact on the sector performance. When the impact is high, a special recovery programme has to be developed for the individual sector. *Figure 17* provides some examples of how the Assessor might identify either financing needs or the scope and priority for recovery through estimate of damage and losses.

It is important to note that the valuation of damage usually is applied to the reconstruction costs and the value of the losses is applied to the economic recovery costs.

Figure 17. From DaLA to Recovery and Reconstruction[19]



[19] *Source: Adapted from the GFDRR DaLA Training material #308*

2. Ensuring Mitigation and "building back better"

According to the United Nations Office for Disaster Risk Reduction (UNISDR), mitigation refers to the lessening or limitation of the adverse impacts of hazards and related disasters. UNISDR continues, that the adverse impacts of hazards often cannot be prevented fully, but their scale or severity can be substantially lessened by various strategies and actions. Mitigation measures encompass engineering techniques and hazard-resistant construction as well as improved environmental policies and public awareness[20].

In the post-disaster scenario, governments seek to use the opportunity created by the disaster to reconstruct their environments in such a way that future risk is reduced for similar or other known hazards. The cost for building back with mitigation is usually above the cost of reconstruction, but this cost is deemed a worthwhile investment as the cost of disruption to lives and livelihoods and the damage and losses caused by extreme events, over successive periods, has been acknowledged as being too great a burden to a country and affects the country's trajectory for development.

The ODPEM has amassed over time a wealth of information and experience in public awareness, community-based risk mitigation and the use of hazard information in the development planning process that will be useful in informing the recovery and reconstruction process. The Assessor should engage with ODPEM in developing recommendations for recovery and reconstruction with mitigation.

[20] *Source: UNISRD http://www.unisdr.org/we/inform/terminology*

Section VIII

Preparing the Final Report

Producing the Final Report need not be a difficult task if the group of Assessors are in constant touch with each other during the assessment exercise. Usually, the team will meet on evenings to share information, keep members up to date on areas of difficulty and to ensure that tasks are not being duplicated, such as collection of damage to farm roads by Agricultural team and also by Infrastructure team.

When preparing the final report, the multi-disciplinary team of Assessors should each be responsible for the preparation of the section of the report on which they were investigating. The team should prepare tables utilising the standard format and submit the results of the damage and losses in tabular form to the macro economists (at the agreed time) to enable the macro economic analysis to begin.

Similar information should be passed to the sociologists on the team who will examine the impact at the micro economic level probing the impact on personal and household income and poverty, concluding with a sound impact analysis on social development. The gender specialist should be involved in the production of the Gender Impact Analysis.

All charts, figures or tables should be referenced in the body of the report if used in the report and numbered consecutively throughout the report for easy reference. It is expected that the report will present the data in the easiest and most attractive manner possible, such as through GIS maps, so as to facilitate easy decision-making by those in authority. The lead investigator should be responsible for final edit.

The report may contain the following elements:[21]

- Preface (Produced by Head of the Department with responsibility for the Assessment)
- Details of the Team of Assessors and the period of investigation (Prepared by lead investigator)
- Executive Summary (Prepared by lead investigator)
- A description of the event (Prepared by ODPEM with data submitted by appropriate scientist)

[21] *Adapted from the SIDS Manual*

- A description of emergency actions (Prepared by ODPEM and submitted to lead investigator)
- Presentation on the Affected Population (Social Sector Team leader)

- Assessment of the damage and Losses Sector by Sector and Total effects of the event (Each Sector specialist is responsible for his/her sector and the material is compiled by the Team Leader. The table on Total Effects is prepared by the macro economist, explanations are submitted by sector specialists.)
- Impact analysis: Impact of the event at the Macroeconomic and Micro-economic levels (the macro-economic impact analysis is prepared by the macro economist and the micro-economic level analysis is prepared by the lead Sociologist or /Social Scientist).
- Making recommendations for Recovery and Reconstruction (Combined team effort, including recommendations from ODPEM, compiled by lead investigator).
- Any relevant annexed material (supplied by all team members).

Section IX

References

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   http://www.eclac.cl/desastres/default.asp?idioma=IN
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4. GFDRR information on PDNA and DaLA training materials can be sourced as follows:
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   DaLA Training Material #106 . GFDRR /Partnership Learning Series DaLA Training Material #308. GFDRR/Partnership Learning Series Damage, Loss and Needs Assessment: Guidance Notes. 2010. The International Bank for Reconstruction and Development/ The World Bank . Vol. 1, 2,3

5. PIOJ Information on past assessment Reports can be sourced as follows:
   http://www.pioj.gov.jm/ResearchandData/DLAResources/tabid/136/Default.aspx

6. ODPEM information can be sourced as follows:
   http://www.odpem.org.jm/

7. Using remote sensing and GIS for damage assessment after flooding, the case of Muscat, Oman after Gonu tropical cyclone 2007: Urban planning perspective

8. U.S. National Oceanic and Atmospheric Administration. Coastal Services Center. 2001. Lessons Learned Regarding the Use of Spatial Data and Geographic Information Systems (GIS) During Hurricane Floyd. NOAA/CSC/20119-PUB. Charleston, SC: NOAA Coastal Services Center.

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Annex 1.
Guide to Categorization of Damage and Losses for Various Sectors

1. Damage and Loss to Infrastructure

Infrastructure	Damage	Loss
Roads/Bridges Electricity Water and sanitation Transport and Communications	Partial or total destruction of roads, bridges, culverts, dams Partial or total destruction of electrical systems (poles, wires, electrical substations) Partial or total destruction of drains or irrigation systems, water supply systems, sewers and other sanitation facilities Partial or total destruction of communication equipment	Loss of revenue from use (tolls or taxes) Loss of revenue from inability to meet demand Loss of revenue due to loss of customer base Increased cost of preparation of alternative sites (in the case of damaged roads or bridges) Removal of debris Higher operational costs

2. Categorization of Damage and Losses in the productive Sectors – Tourism and Manufacturing

Productive Sub Sectors	Damage	Losses
Tourism	Damage to Hotels (partial or total) Damage to furnishings Damage to landscape/grounds Damage to stock/inventories Damage to equipment	Lost business revenue due to lost capacity Lost revenue due to cancelations Lost revenue due to reduction in room rates Lost revenue due to higher operational costs
Manufacturing	Damage to Plant Damage to equipment Damage to stocks /inventories	Lost business revenue due to inability to meet demand (partially or fully) Higher operational expenses Removal of debris and or demolition

3. Categorization of Damage and Losses in the Social Sector

Sector	Damage	Losses
Housing	Cost of houses damaged Cost of houses destroyed Cost of household furniture and appliances lost due to event	Loss of income from rent Cost for relocation Loss of income from backyard economy Loss of income from home-based small/micro businesses Additional costs for clearing debris and demolition
Health	Cost of damage to hospitals and other health facilities Cost of damage to equipment	Additional expenditure for extra medicine Additional expenditure on vector control Additional expenditure on public health education and communication Additional expenditure paid to health care providers for additional services provided during the period Loss of income due to services which were unable to be provided Additional operating cost that may have been incurred such as for the generation of electricity or the supply of water. Cost of clearing debris and demolition
Education	Cost of damage to school structures Cost of damage to school furnishings (desks, chairs, computer equipment, laboratory equipment, AV equipment) Cost of damage to sporting facilities and equipment held therein	Cost of repairs to education/sport facilities used as shelters and relief centres Loss of income to schools where fees are paid Loss of income to Day care and other educational services which may have been disrupted due to the event Loss of income from rental of venues or events which may have been planned for the sporting facilities Cost of demolition and clearing of facilities Additional Operating expenses that may have been incurred as a result of the event.

Notes