Section C6

Agriculture and Fisheries

Objectives

- ❑ Note the differential effects on the agriculture and fisheries sector of different types of disaster.
- ❑ Discuss the sources of information open to the evaluator and the management of that information.
- ❑ Analyze the effect of a hurricane on the sector, examining the direct, indirect and secondary damage done.
- ❑ Gain an appreciation for the calculation of damage and the establishment of an audit trail

The differential effects on the agriculture and fisheries sector of different types of disaster

Different types of disaster can affect the agriculture and fisheries sector differently, in accordance with the nature of the event. An earthquake associated with a volcano, for example, unless accompanied by large pyroclastic flows, will generally not create widespread destruction and damage in the sector. Our main concern in this session would therefore be to examine the effects of hydrometeorological damage such as that occasioned by hurricanes, storms, flooding, landslides and droughts. Mudslides would tend to affect the agriculture sector, usually to the exclusion of major tourism, industrial and commercial activities. In Jamaica, the October 2001 flooding in the parishes of Portland, St. Mary's and St. Ann exerted effects on the agriculture sector, mainly.

The focus in this session is on hurricane or flooding effects.

The evaluator's approach to measurement of damage in this sector is the same as that of the other sector specialists. The uniformity of approach defines the elegance of the methodology and the ease with which a summary of damage on the entire economy and society can be made.

The specialist must obtain a clear idea of the nature and extent of the damage in geographical terms as well in terms of its significance to the rest of the economy. The importance of the sector in the distribution of value added will define its importance nationally. His/her interaction with other team members covering other areas including the environment will result in a fuller description of effects without duplication in accounting for damage. The geographical delineation of the occurrence establishes in the mind of the evaluator the boundaries of his/her research into the event. Consideration of indirect and secondary effects establishes the linkages between the sector and the rest of the economy.

The sources of information open to the evaluator and the management of that information

The evaluator will become aware of all sources of information as presented in the session that addresses information management. Data from the Statistical Office and the Ministry of Agriculture will form the major portion of his/her data requirements, but these will be supplemented by information coming in from remote areas or from information collected in informal interviews conducted by the specialist with affected agricultural workers on the scene of the damage. The importance of information sharing among evaluators who meet every evening to discuss progress and measurement challenges cannot be over-emphasized.

The evaluator must determine the quantity and value of production lost and the destination of that produce. This information will determine the loss in livelihoods and foreign exchange resulting from a fall in exports.

The data sets with which the evaluator must work include monthly or quarterly estimates of agricultural production. These are available by crop and can be used to determine the loss of production and farmers' income as a result of the event. The following worksheet will assist in the estimate of what annual production would have been had the disaster not occurred and what it turned out to be after the disaster.

The information collected must have the benefit of worksheets that have been carefully completed to yield information (in the case of measuring direct damage) that leads to the derivation of the direct damage estimate. Table 22 below presents a normal situation of incomplete data with which the evaluator must work.

Exercise

1. You are required to look at the following table and arrive at a production estimate for the year 2000 production using linear interpolation. You are also required to put in the missing figures as indicated by the question marks.

Table 22
Production of selected traditional Export crops, 1997 – 2000

ITEM/ PARTICULARS	Crop year	Unit	1997	1998	1999	Jan-Sep 1999	Jan – Sep 2000	2000 Estimate
Bananas	Jan - Dec							
Purchases		Tonnes	79839	62338	52208	50000	60000	
Exports		Tonnes	79707	61938	52208	50000	60000	
Coffee (Cherry)	Aug – July	Tonnes						
Est. Total Production			18612	16727	13136	12700	15000	
Blue Mountain			12913	10199	8627	8000	?	
Lowland			5699	6528	4509	4700	5000	
Cocoa	Oct - Sept	Tonnes						
Deliveries to Processing plants			4071	4167	2549	2000	2500	
Outturn from Processing Plants			1653	1687	1036	1000	1200	
Coconut	Jan - Dec	Tonnes						
Production expressed as Copra equivalent weights								
Total		Tonnes	21101	19663	20113	18000	21000	
Used for Copra		Tonnes	1112	272	303	260	450	
Used for processing		Tonnes	72	52	61	40	60	
Used for dry and water coconuts		Tonnes	19917	19339	19749	17700	?	

Source: An adaptation from Planning Institute of Jamaica (PIOJ) data.

Direct and Indirect damage and secondary effects

❖ Direct damage

This takes into account the loss of any or all of the following:

- Damage to farmland.
- Damage to the physical infrastructure, including irrigation and drainage systems, stores and silos.
- Damage to machinery and farm equipment.
- The loss of crops ready for harvesting.
- Losses of stock (livestock, inputs, and harvested products)

Whereas the loss of harvests ready for the market is accounted for as direct damage, the loss of future harvests that will not come to production because of the disaster are counted as indirect damage. One may think of the emerging crops not as a stock, for they have zero market value at that time, but as a flow approaching the time when they are ready for market and thus have a market value.

- **Estimating the loss of land**

Where land has been lost through erosion or sedimentation, a value can be imputed to the loss on the basis of projected production over 10 years, given an estimate of average productivity levels of the area suffering the damage. This type of information is available in the Ministry of Agriculture.

Where land has been damaged temporarily through the deposit of materials brought down by floods, a proxy value of the damage can be estimated based on the cost of clearing the land and restoring the vegetation that existed before the event. The sector specialist must work on this with an engineer.

- **Estimating the damage to agricultural infrastructure and equipment**

Estimates of damage are based on physical units which are costed. Kilometers of farm road, the number of tractors destroyed, square footage of destroyed barns and office space are estimated then costed to yield a damage estimate.

- **Production losses**

Only production that is ready to be harvested at the moment of the disaster can be taken into account as production losses. Goods ready for harvesting are considered to be stocks and qualify to be included in the estimate of direct damage.

In the case of livestock, loss of animals will not be recorded as loss of production. The animals are assets (stock). The valuation of stock losses is possible if the livestock is broken down into its component groups of animals and assigned values. The assessor will estimate in dollar terms the loss of cows as separate from the loss of sheep, for example.

❖ Indirect damage

Indirect damage refers to the loss of production over the recovery period as a result of the disaster. It also includes the cost of works necessary to mitigate damage by similar phenomena in the future. A number of examples follow.

In the agricultural sector, late replanting after the disaster may mean that a crop is missed as the produce is not brought to fruition. In the case of permanent crops, damage to plants results in reduced production.

Trauma resulting from the disaster can inhibit livestock and result in poor performance and production. A reduction in the production of eggs, milk and reproduction is not unusual.

In the case of fisheries or aquaculture, the broaching of ponds can result in reduced production during the rehabilitation period.

❖ Total damage

This is the sum of Direct and Indirect damage. Table 23 presents a statement of total damage and its direct and indirect components. The final column quantifies the imported component of the damage. It indicates the balance of payments repercussion of replacement.

Table 23
AGRICULTURE
Direct & Indirect damage estimates
(J$ Million)

Parish/crops	Hectares	Direct Damage	Indirect Damage	TOTAL DAMAGE	Of which Imports
Crops	**1911**	**461.3**	**46.13**	**507.43**	**25.3715**
Portland	355	38.8	3.88	**42.68**	2.134
St. Mary	103.1	43.6	4.36	**47.96**	2.398
St. Catherine	51	5	0.5	**5.5**	0.275
St. Ann	86.4	9.4	0.94	**10.34**	0.517
St. Thomas	140.8	15.2	1.52	**16.72**	0.836
St. Andrew	267	241.3	24.13	**265.43**	13.2715
Clarendon	62.5	13.1	1.31	**14.41**	0.7205
Westmoreland	79.5	12.9	1.29	**14.19**	0.7095
Hanover	67	11.2	1.12	**12.32**	0.616
St. Elizabeth	516.8	55.2	5.52	**60.72**	3.036
Manchester	34.7	1.6	0.16	**1.76**	0.088
St. James	83	1.8	0.18	**1.98**	0.099
Trelawny	64.2	12.2	1.22	**13.42**	0.671

Table 23 (continued)

Parish/Crops	Hectares	Direct Damage	Indirect Damage	TOTAL DAMAGE	Of Which Imports
Livestock		**30.8**	**3.08**	**33.88**	**1.694**
Portland		18.3	1.83	**20.13**	1.0065
St. Mary		2.9	0.29	**3.19**	0.1595
St. Catherine		0.5	0.05	**0.55**	0.0275
St. Ann		0.2	0.02	**0.22**	0.011
St. Thomas		1.1	0.11	**1.21**	0.0605
St. Andrew		1.1	0.11	**1.21**	0.0605
Clarendon		0.8	0.08	**0.88**	0.044
Westmoreland		0	0	**0**	0
Hanover		1.4	0.14	**1.54**	0.077
St. Elizabeth		1.3	0.13	**1.43**	0.0715
Manchester		1.6	0.16	**1.76**	0.088
St. James		1	0.1	**1.1**	0.055
Trelawny		0.6	0.06	**0.66**	0.033
TOTAL CROPS PLUS LIVESTOCK		**492.1**	**49.21**	**541.31**	**27.0655**

Source: Data supplied by Ministry of Finance and RADA and mission estimates.

❖ Measuring direct and indirect damage

Damage to physical assets

The evaluator must work with information provided by the national team members but is free to disagree with any estimate if he or she has reason to do so. Different sources of information will be needed. The Ministry of Agriculture and the Ministry of Works can provide estimates of the following:

- ❑ Damage to affected land
- ❑ Damage to the irrigation and drainage systems

- Damage to machinery and equipment
- Estimates of lost produce
- Estimates of lost inputs such as fertilizer, feed and other chemicals
- The valuation of livestock
- Damage to buildings and installations

This information should take the form of clearly presented tables with the estimates. In the case of machinery and furniture, the evaluator can cross check prices with the local suppliers.

The evaluation of damage to buildings would be approached from data on the estimated cost per square foot or square meter of buildings of varying types. The Town and Country Planning Offices are usually in a position to provide such data.

The cost data are applied to the estimate of physical damage to produce a dollar estimate of damage.

Indirect Damage

Whereas direct damage is reasonably simple to estimate, the estimate of indirect damage on the annual performance is dependent on the time of the year at which the natural event takes place. Since this concept refers to production flows, care must be taken to estimate the effect on the annual performance of the sector.

- **Secondary effects**

The evaluator must examine the impact of the disaster on the main macroeconomic variables. In so doing, he/she will examine the inter-industry linkages that exist between the agricultural sector and the other sectors of the economy. The indirect damage to the agricultural sector will be felt across the economy if the sector is closely linked with the tourism and distribution sectors. The effect of a fall in exports will be commented on in the assessment of secondary effects. This will be taken up by the macroeconomist and team leader in the preparation of the appraisal of macroeconomic effects and in the presentation of the report.

Requirements for a good evaluation

The following is a checklist of data elements required for the evaluator to complete a good evaluation:

- ❑ A clear definition of the nature and geographical area of the damage
- ❑ A clear summary of the physical damage. This includes the elements of land, buildings, machinery, office equipment, stocks and infrastructure, even if infrastructure will be excluded from the valuation in the sector in favour of being highlighted in a separate section of that name.
- ❑ The loss of crops ready for harvesting
- ❑ Losses of stock that include livestock, inputs and harvested products
- ❑ Worksheets itemizing the above elements and recording the methodology and calculations made to arrive at the estimates. It is important that the assumptions behind the use of any method be recorded in the event of the need to revisit the estimate.

The careful recording of input data, assumptions used and methodology employed in the calculations is in fact the audit trail.

❖ Self assessment

By now, you have the concepts of Direct and Indirect damage firmly established. You are familiar with the type of recording of data that you must do to establish a clear audit trail and you can manage your information sources. If you are unclear about any aspect of the preparation of estimates for this sector, please revisit the text or ask for help.