MANUAL FOR
ESTIMATING THE SOCIOECONOMIC
EFFECTS OF NATURAL DISASTERS

Part Four

ECONOMIC SECTORS

INDEX

I. AGRICULTURE AND LIVESTOCK HUSBANDRY

A. INTRODUCTION

1. General observations

Not all disasters affect the farm and livestock sector in the same way nor with the same intensity and, in fact, some disasters affect mainly only farming. For this reason, the evaluator should, first, in coordination with the other evaluators, make an accurate appraisal of the characteristics of the disaster, its impact on different sectors and, naturally, define the role of each evaluator within the context of the final report.

The civil engineer will often be unable to evaluate damage to agricultural infrastructure until the agricultural evaluator has appraised the general situation of that sector and the damage done to equipment which will hinder farm and livestock sector operations; for example, destruction of farm installations, flooded trench silos, clogged irrigation or drainage canals, etc. In this type of situation, coordination among evaluators is of utmost importance, in function of time and the work priorities of the farm evaluator.

As noted above, some disasters, such as droughts or flooding in farm regions, have their most severe impact on the farm and livestock sector. Others, such as hurricanes, have significant impact on agriculture, even though those effects depend on the characteristics of the phenomenon and its geographical extent. Nevertheless, hurricanes in the Caribbean region have affected both farm and urban zones with equal violence. Some disasters, such as earthquakes, when they destroy storage silos and affect the availability of foodstuffs, affect the farm and livestock sector only indirectly; some landslides may affect rural and urban zones equally

Therefore, the evaluator should, first, concentrate on clearly defining the scope of the phenomenon to be evaluated, so as to better plan his/her work and delineate its inter-sectoral ramifications. The farm specialist should also evaluate the immediate and future availability of foodstuffs. This is a factor common to all disasters because, as daily routines are interrupted by the disaster, habitual flows are disrupted and food may become scarce. In certain types of disaster, the emergency makes it necessary to abandon conventional activities, by imposing emergency tasks and interrupting or complicating the supply of foodstuffs Concern for possible food shortages may be vital, depending on the disaster, and the farm and livestock evaluator is responsible for perceiving and quantifying them, as well as for suggesting ways of facing those shortages. Earthquakes are a clear example of situations in which food is needed immediately, a drought poses the problem of future shortages, given that the phenomenon makes it impossible to produce and endangers future harvests.

Once again, farm evaluator familiarity with the characteristics of the disaster is a first step in his/her specific task, because that knowledge provides a preview of the scope of the evaluation itself For example, hurricane winds are devastating. It is important to know the storm's trajectory so as to define the affected regions exactly and, naturally, to determine the crops involved. Moreover, a hurricane nearly always generates torrential rains which may last for days and cause flooding Often, crops, such as the African palm, resist strong winds but may succumb to lengthy flooding Moreover, each disaster has different implications, depending on its origin. Earthquakes are nearly always very local events; droughts, on the contrary, may even affect several countries In other cases, natural phenomena have multiple effects, as in the case of generalized climatic change, such as that which occurred in the Andean plateau in the early 1980s, which caused droughts in the high country and heavy rains and flooding on the coasts, seriously affecting three countries.[1]

It is also important to consider the time of year when the phenomenon which causes an agricultural disaster occurs. A hurricane in the month in which coffee plants are in flower may cause definitive damage to that year's crop, because, with the flower destroyed, the plant will not produce fruit and the anticipated harvest will be considerably reduced, if not totally lost.

The same may occur with annual crops. The impact of a flood is not the same if it occurs when plants are very young, because it may be possible to re-plant, as when it occurs shortly before harvest time In the latter case, the investment has been greater and it will surely be impossible –for lack of time– to re-utilize the land that year. Naturally, the magnitude of the damage in these two cases is different. For that reason, the type of crop should be mentioned. For example, a hurricane which hit a Caribbean island in the 1970s came ashore in a zone of coffee plantations, which were affected. In some areas, they were totally destroyed and trees were uprooted, while, in others, destruction was only partial and, naturally, damage was less.[2]

In the event of a disaster, permanent crops usually suffer more serious damage because they grow more slowly. When plantations are partially lost, the land must be planted again; often infrastructure must be rebuilt (canals, drains, storage facilities, etc), and several years must pass before the new plants will produce.

The farm evaluator should determine lost production as soon as possible. In a zone of subsistence farming, the repercussions on the region may be high socially, because those producers will not be able to meet their most immediate subsistence needs.

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[1] See CEPAL, Los desastres naturales de 1982-83 en Bolivia, Ecuador y Perú, (E/CEPAL/G.1274), 1983

[2] See CEPAL República Dominicana :Repercusiones de los huracanes David y Federico sobre la economía y las cobnciciones sociales, (E/CEPAL/G.1098), 1979

If a zone which produces for farm trade is affected, the quantification should be limited to the loss of produce, the evaluation of the country's overall needs and the determination of the need for supplementary imports, if necessary. On the other hand, when the zone produces raw material for industry (sugar cane, sisal, vegetables for canning, etc.), there may be subsequent implications for industry, including the possibility of work stoppages, with impact on employment and the income of those affected. Some industries, such as sugar mills, have their supply zone on neighboring land, when plantations are destroyed and production drops, the days worked at the mill also drop and it is very difficult to supply cane from other regions, due often to shipping costs or other transportation problems generated by the disaster itself.

2. Describing the damage

On describing the damage, the farm evaluator should indicate the type of crop involved and the geographical extent of the damage. If it is a permanent crop, damage will occur in different degrees, depending on whether the crop was totally lost, or only partially damaged, if the damage only affects this year's production, etc. The description should be accompanied by a quantification of the affected area and production. This is necessary because the same phenomenon –for example, a hurricane– may totally destroy plantations in its path but, at the same time, may generate excessive rains which flood some crops, which suffer for that reason –such as banana plants– or which lose their flower –such as the coffee plant– due to strong winds. One phenomenon may cause all these different types of damage, so that the evaluator must describe the nature of the phenomenon, in order to be clear with respect to the multiplicity of probable effects when calculating costs.

A hurricane which struck the northern zone of a country on the Central American Isthmus in the 1970s is a good example of this problem.[3] The phenomenon landed on the north eastern Atlantic coast, entering a river valley with an East-West orientation, and damaged a highly productive zone, of excellent soils, the main products of which were bananas, African palm, corn, rice and livestock. The banana plantations, which practically disappeared, were in the centre of the hurricane's path and only 50 km inland. However, on the other side of the river, 25 kms further on, there were oil palm plantations which not only resisted the strong winds but also subsequent flooding, for 15 days. The rice and corn planted in the zone practically disappeared, although that located in the upper reaches of the valley survived. As for livestock, nearly all minor stock, such as fowl, pigs and goats, disappeared, as did some of the cattle, which did not manage to find refuge in the upper reaches of the valley. Thus, many ranchers lost their stock, which represented all their capital, not so much because it died but because it moved and, later, did not or was not allowed to return.

[3] See CEPAL, Informe sobre los daños y repercusiones del Huracán Fifi en la economía hondureña, E/CEPAL/AC.67/2), 1974.

The effort should be made to describe the entire range of effects on the farm and livestock sector: on natural resources, on physical infrastructure and working capital; blocked or clogged canals, machinery totally or partially destroyed, dead animals, etc Disasters usually damage soils, which should also be described in detail to facilitate quantification Excessive rains may cause landslides or river overflows which destroy farm land, be it good land or not, which can never be recovered, constituting serious economic and ecological damage. A volcanic eruption may cause temporary damage by destroying crops, but may be beneficial in the mid- and long terms by increasing crop yields.

The destruction of terraces, the accumulation of debris etc cause losses, but those resources can be restored exactly as they were prior to the disaster. Detailed descriptions will make it possible to identify repercussions on future production or on stored produce or inputs. A hurricane, which also causes flooding, may bring about a drastic reduction in milk and egg production, which may last several months and have a psychological impact on the animals which reduces their productivity. Although the evaluator may be unable to quantify this type of indirect effect, they should at least be mentioned in the report, if deemed appropriate

It is easier to describe stored produce or inputs because only product type and quantity need be identified, and whether the damage was total or partial In some cases, a product is only rendered unsuitable for one specific use, while it remains apt for another. For example, damaged corn, originally destined for human consumption, may still serve for fodder.

3. Sources of information

Given the limited time available for the task at hand, the evaluator should have recourse to all elements which will make it possible to characterize the phenomenon and the damage it has caused, from the perspective of the farm and livestock sector For this purpose, potentially useful provisional information, elaborated during the emergency phase, will probably be available.

In fact, one of the first steps taken by the authorities of countries affected by a disaster is to make a rough global estimate of its economic implications and its impact on diverse sectors Those pre-evaluations identify the most severely damaged zones, the scope of the phenomenon and its impact on the economy. It often occurs that, due to speed with which they are effected and subjective factors related to its impact, the damage and its effects are over-estimated, so that caution is needed on verifying the information contained in those pre-evaluations. They are, however, very useful as a means of identifying affected geographical areas and crops.

Immediately after the disaster, the government concentrates on quantifying the nature of the damage. That information is vital for the evaluator because, usually, experts who reside in the affected regions and know the types of crop involved, the yields and all

other indicators needed to refine the report, have participated in those pre-evaluations. Statistical series for several years should also be examined, because they will explain trends and yields in the regions affected and will indicate, in quantitative terms, what the production and its value would have been, had the disaster not occurred This will make the eventual comparison between the pre-disaster situation and that which obtained after the event possible.

Initially, the evaluator should attempt to gather as much information as possible from diverse sources, even though it appears to be contradictory. This will make eventual verifications possible and allow for the use of that data which the evaluator deems best reflect what happened. For this reason, it is indispensable that the evaluator visit the affected region as extensively as possible. Field trips may, at times, be complicated by damage to the means of communication, so that recourse should be had to air transportation –preferably helicopter– given the ease with which stops can be made in different places. If visiting the whole region is difficult given the lack of facilities,[4] the evaluator should give priority to field visits in function of the available facilities, the extent of the physical damage (for example, if there are many homeless persons and infrastructure has been destroyed), and according to its economic importance (for example, if coffee plantations, whose production amounts to half of the currency generated by the country, have been destroyed, etc.) At any rate, he/she will have to be selective and should visit that zone which is more economically and socially relevant.

During the visit, local functionaries and persons affected by the disaster, who have first hand experience and information which will aid in the comprehension of the magnitude of the disaster and its effects, should be interviewed Technicians of different levels and specialties should be contacted, for example, the representative of the Ministry of Agriculture may have an overall vision, while the field technician has a very particularized view of the zone where he/she works. Contact should also be established with the merchants, lenders of services, dealers in agricultural inputs, etc , who know the structure and magnitude of local demand for food and raw material originating in or destined for agriculture. All these data will assist the evaluator in the conformation of his/her own vision of the facts.

Preparation for these interviews should involve the definition of what is to be learned in the field. If estimates of damage to infrastructure are not available at the central level, the field visit will be an excellent opportunity for obtaining that information. If, on the contrary, there are unverified estimates, the interviews will make verification possible. To know what is sought or what is needed and how to obtain it are, in brief, essential for the evaluator.

No type of information nor any opportunity to discuss the disaster should be neglected. For this reason, the farm evaluator should interview national personnel who participated in the preliminary evaluation or who are involved in agriculture in different ways; for

[4] Occasionally, all air transportation is dedicated to emergency activities an is unavailable for other types of missions.

example, personnel from the relevant planning office, Directors of specialized institutions involved in the zone, such as coffee, cattle, banana, etc institutes, representatives of coffee grower or cattlemen's associations, dust crop pilots, etc The same should be done with international personnel active in the affected zone. (Development projects of FAO, PMA, BID, and the World Bank, etc.)

The companies which process agricultural products in the region, such as pasteurizing equipment, packers, canneries, etc., should also be interviewed because they may assist in the appraisal of the effects implied by the lack of raw material and may provide the evaluator with rapid additional indications about employment, recovery times, etc.

Finally, the press may serve as a useful source of knowledge about the phenomenon, specially in the first stage. Press clippings and other journalistic information should be collected.

B. QUANTIFICATION OF DAMAGE

1. Direct damage

Direct effects on the agricultural sector refer to a range of damage to the supply of fixed and circulating capital, which may be broken down into that sustained by arable land (which it may take years to recover), that sustained by infrastructure, including irrigation works, installations, silos, etc.; that sustained by equipment (tractors and other farm machinery); and by stock (of cattle and harvested crops, pasturage inputs, etc.). See Chart 1 for an example.

a. Loss of land

When land is destroyed –by erosion or total sedimentation– it is difficult to estimate its cost because replacement is not possible. The resource has been lost and nothing can be done about it. In those cases, it should be assigned a value equal to what that land would produce in 10 years, according to average production levels in the zone. For example, if an hectare of bananas produces an average yield valued at 20 000 dollars, in 10 years it would produce 200 000 dollars And that would be the value of each hectare lost in the disaster.

When land can be totally recovered, even when it has been covered with trees, branches and other debris deposited by flooding, recovery costs can be calculated on the basis of costs for clearing an hectare covered with shrub vegetation. This information can be obtained from a land clearing business, either private or from the national institute of development. The same holds true for destroyed terraces or elevation curves. The farm evaluator should estimate the number of square meters of buildings destroyed and, assisted by civil engineers, calculate the recovery cost of the destroyed resources.

It is difficult to evaluate the damage sustained by land which has been invaded by a foreign agent but which, essentially, has not been rendered useless, as may be the case with a volcanic eruption, accompanied by extensive deposits of ash on land. That land may not produce, in the short term, and only when the situation which originated the disaster has stabilized will nature once again allow vegetation to grow in the region. The time that takes may vary For example, a volcanic eruption in a Central American country, which occurred when cotton was being harvested, affected its fibre, thus lowering its commercial value. The following year, agriculture could be renewed because the ash layer was not thick and farm machinery managed to mix the ash with the soil. Surely, if the ash deposit had been thicker, recovery time costs would have been greater and, naturally, the direct and indirect effects would have been more severe. The value of lost harvests and of those which could not be brought in, due to adverse conditions, should be included among the indirect effects.

b. Damage to infrastructure and equipment

Production infrastructure (machinery, equipment, irrigation works, warehouses, etc.) may suffer damage In order to calculate those losses, estimates should be made in each case of the amount lost, in terms of kilometres of irrigation or drainage canal, number of farm or livestock installations totally lost (preferably in m2 constructed), etc. All buildings, insofar as possible, should be calculated in square meters of damaged construction, because, in this way, a civil engineer will be in a better position to calculate replacement costs

c. Production losses

When crops are completely destroyed by a disaster, the surface area affected should be quantified and the costs incurred by farmers, according to the maturity of the crops should be estimated so as to obtain the total cost of the crops lost. If livestock has been totally destroyed, it will be necessary to determine the number of animals involved, multiply it by the average estimated market value to obtain the total sum involved.

Care must be taken to calculate permanent crops separately from annual crops. The relevant unit values for costs are different in each case. When annual crops are destroyed –depending on the time of year, whether they are dry land crops or whether irrigation is available–, estimates of the cost of replanting damaged areas, both so that farmers ensure their income for the year and so that the country will balance the supply of produce, should be estimated.

Estimating the replacement value of permanent crops is somewhat more difficult. To this end, annual costs involved in restoring the plantation to its former levels of production must be identified. (Income lost while the plantation is growing should be included as an indirect effect)

In some plantations, it will be necessary not only to replant damaged areas, but to repair production infrastructure, such as cables for moving bunches of bananas to packing plants, internal tram ways for moving personnel or inputs, etc The farm evaluator should also quantify those costs, directly related to production. They are easy to calculate with the aid of local personnel and, specially, the affected farmers or companies

d. Loss of stock

When the disaster strikes after harvests that have been brought in and they are in silos or warehouses, their condition must be estimated to determine the degree of loss To this end, the commercial sale price should be applied to lost tonnage. The same procedure should be followed for all inputs lost or damaged, assigning them their replacement value.

In the case of livestock, it is necessary to distinguish among stock being fattened, breeding and stud stock, given that they have different unit prices.

Moreover, some livestock activities –such as poultry production– can be replaced rapidly, beef husbandry, on the other hand, has high recovery costs and a long time is required Apart from the capital lost (livestock), the expense required to build the herd back up to its pre-disaster levels should be estimated, in the case of commercial beef production

In regions of small farm or mixed agriculture, livestock husbandry is usually only complementary to farmer income. Nearly all families have chickens, pigs and some steers. In this case, quantification should distinguish animals of greater value (such as draft animals, given that their disappearance has repercussions for the future) from that of the minor animals which complement farmer income and constitute an important source of protein in the family diet, but are difficult to quantify In those cases, it is recommended that they be designated as a percentage of total family income and of that of the zone (between 10%, for zones of infra-subsistence agriculture, and 40%, where family subsistence farming is more developed). The judgment about the percentage to be assigned depends on the experience of the evaluator and the value judgments made during the field visits.

Fodder, harvested previously, may also be lost in its storage place, either in silos or packed dry. The recovery costs for silage and dry fodder should be estimated with the aid of local technicians and livestock farmers of the region.

As for the criteria for determining the value of direct damage, it has already been stated that in most cases, the real replacement costs or market prices of the destroyed goods at the time of the disaster should be used, although efforts should be made to avoid use of the speculative prices which may occur. Some will be easy to calculate, such as the recovery of both capital and production inventories, given that the prices of those elements are usually available in the trade sector

As for infrastructure, given that buildings are under consideration, costs should be calculated by a civil engineer with the assistance of the farm evaluator, who should prepare an inventory of what has been damaged so as to facilitate the work of the engineer. In some cases, it will be necessary to make small temporary investments, for example, to make an irrigation system operative, which, with its dressed wall channels, has been damaged but is still functional, if the necessary machinery is rapidly available. That cost should be estimated by the farm evaluator, leaving the cost of repairing the walls, which will be made later, to the civil engineer

2. Indirect damage

Indirect damage consists mainly in farm and livestock production which will not occur during the recovery period This may be due to the total or partial destruction of land, physical infrastructure, roads, storage capacity, etc. A general rule is to formulate loss estimates in terms of physical volume, taking into account the characteristic productivity level of the affected zone, disagregated by crop type. The cost of the works needed to avoid or mitigate the effects of similar natural phenomena in the future are often included as indirect costs.

Some times, the disaster affects permanent crops during their growth, not destroying them, but limiting that year's production. The most representative case is coffee, in some regions, and fruit, in others. Those crops flower and the permanence of the flower is important for the development of the fruit; if that does not occur, the crop is lost or the yield is of little commercial value. In that case, the evaluator should determine the value of the income not perceived and include it as an indirect effect.

As noted above, certain types of disaster reveal the need to construct defense systems against future disasters. Part of the indirect damage caused by a hurricane in a Central American country was the sequel of floods, themselves caused by excessive rains and the incapacity of the river to evacuate water rapidly to the sea. Large amounts of debris, produced by the natural phenomenon were deposited in the river bed and at its mouth, given the inadequacy mentioned above and the lethargic flow of its waters This led to continual overflows (nearly every year), making dredging operations at the mouth and along the final stretch of the river necessary Costs such as these should be included among indirect costs because they constitute investments made to restore normal operational patterns to the zone. Other cases may arise, such as the construction of river banks, rectification of channels, wind break reforestation (in zones subject to high winds, landslides, etc).

With regard to livestock production, mention has already been made of diminished production due to the emotional impact of the disaster. For example, after a hurricane, chickens cease to lay eggs, animals lose weight, cows produce less milk and, in some cases, cease giving completely, etc. Since quantification for evaluation is difficult, this factor should be assigned its total value, which experience has shown to be not more than 20%. In some cases, when the disaster zone has acquired a degree of industrial

specialization (for example, in a zone of dairy production), reductions in local production may be greater and damage more severe. In that case the evaluator should make a more intense evaluation effort, seeking the advice of local experts and, even undertaking field visits and direct interviews with affected persons

Verifying the state of pasture land and grasses is particularly important in the case of cattle raising. When the disaster involves flooding, the water which covers grasses for a long time may destroy them, as occurs with Star, Jaragua and Taiwan grasses. When this occurs, the cost of re-seeding should be calculated in terms of surface area destroyed. Farm credit banks possess information about those costs.

Where subsistence farming is prevalent, the disaster may produce food shortages, usually corrected through donation or food for work programmes. If those programmes continue after the emergency period itself, their costs should be defined as indirect and be estimated on the basis of the affected population, in combination with a basic food basket, made up of the most commonly consumed foods in the region. The relevant time period is that necessary for subsistence farming to be restored in the zone

3. Unit costs for evaluation

In the course of the investigation, the evaluator should obtain price lists from diverse sources, so as to be able to select the most appropriate price for the item being evaluated, when the time comes to calculate costs. The most common lists are government at cost prices; commercial prices; producer prices, consumer prices, and import prices. The use of these lists is determined by the item in question and its market destination.

a. Government at cost prices

Generally, governments operate imports programmes through which they pass goods along to consumers at subsidized prices. This may occur when food is lacking at the national level or in the case of a particular project. A government may import machinery or subsequently barter for it with domestic produce, using it subsequently in development programmes or selling it through credit programmes run by farm credit banks.

Those governmental acquisition prices, which are usually very low, may be used in very special cases when, for strategic or immediate reasons, the rehabilitation programme will be operated entirely by the government.

b. Commercial prices

Commercial prices for goods and services are indispensable for calculating many of the costs of a disaster Given that the brief time available makes it difficult to undertake a survey of commercial businesses, the governmental offices which manage price lists,

such as the Ministries for Trade or Economy, should be consulted. Commercial prices should be used when inventories are to be replaced (machinery, farm inputs, tools, reproduction stock, etc.)

c. Producer prices

Statistical centres usually maintain broadly focused records of prices paid to farmers for their produce, specially when government entities guarantee prices Those prices should be used to calculate the cost of goods brought in from non-affected areas of the same country and when, for some reason, commercial prices are not paid This criterion may also be applied when processing industries which habitually acquire raw material from the affected zone must have recourse to other zones of the country to satisfy their needs. In those cases, the price paid to farmers is used to calculate the cost of goods attributable to the disaster.

d. Consumer prices

The price consumers pay for products is usually higher than that paid to the producer, due to commercialization costs. For some calculations, those prices should be used, specially when the affected population is preeminently urban, as occurs in the case of earthquakes, floods in cities and urban centres, hurricanes which affect population concentrations, etc.

For example, after earthquakes, temporary camps are constructed (which may last years) to attend to the homeless, in which food is distributed free during the reconstruction period. Those costs, attributable to the disaster, should usually be calculated in terms of consumer prices, even though the food comes from aid programmes or donations, involving no cost to the country, because, even so, that food represents an additional cost caused by the disaster

e. Import prices

Finally, it will occasionally be necessary to import a certain type of good which the affected country does not or cannot produce. In this case, a list of appropriate prices at real, that is, importation, values should be obtained, which include insurance, shipping and commercialization margins Those items are usually vehicles and all kinds of machinery (tractors, pumps, harvesters), certain kinds of equipment (automatic milking machines, grain elevators, grain dryers, decauville cars, etc) In this regard, the evaluator should consult commercial firms which deal with the relevant types of product or project managers in government offices which will surely have information about those products for the calculation of project costs

C. SECONDARY COSTS

In order to calculate the overall effects of damage on the gross domestic product, a chart of production in normal conditions should be prepared, in order to obtain a basis for comparison with anticipated post-disaster production That comparison is made for all, or for the most important, products, (which involve at least 85% of the affected country's or region's agricultural GDP). Physical and value units should be used, with any of the prices mentioned above which reflect the situation and conditions of the disaster zone (See chart 2). This will make inventory voids visible and reveal global implications for the sector The identification of those voids and their cost should then be used in the calculation of total costs within the farm and husbandry sector.

Chart 3 presents capital replacement costs, at the farm level, globalizing the data contained in another chart, where they have been disagregated by the different concepts employed in the evaluation The example contained in that chart will make the evaluators's task of calculating the global estimate easier.

Another chart (whose format is presented in chart 4) should also be prepared which breaks down replacement costs related to damage sustained by the infrastructure which serves the region as a whole. In this case, many items should more properly be evaluated by the civil engineer than the agronomist, although they should be noted in the farm report so that the civil engineer will subsequently make the appropriate calculation.

It is often very important that the analyst include a nutrition appraisal in his/her evaluation, which will identify national food needs for the entire rehabilitation period, from the time of the disaster until domestic produce is once again available In that appraisal, all available foods should be taken into account, regardless of their source Chart 5 presents a format which may be useful for that exercise.

D. FINAL RECOMMENDATIONS

A detailed evaluation of the farm and husbandry sector, specially when the impact of the disaster has been most significant in that sector –that is, when the disaster has been caused by a hurricane or flooding or drought–, is very important for the global economic evaluation, which is, at bottom, what is being sought. For this reason, the evaluator should prepare beforehand, gathering analytic and explanatory material on the farm sector in the country in question and in the affected zone, if possible. This will include diagnoses, development programmes, farm projections financed by international banks, reports of organizations such as FAO, PMA, IDB, the World Bank, etc ; reports on the country's main exports trade prepared by specialized multinational offices such as UPEB, for bananas, GEPLACEA, for sugar, etc. The reports prepared by the US Department of Agriculture, through the Foreign Agricultural Service, on national farm sectors are also

useful, as are the Latin American economic and social progress reports of the ID, and others

Finally, Chart 6 presents a list indicating some farm produce prices.

Chart 1

DAMAGE IN THE AGRICULTURE AND LIVESTOCK SECTOR

(in millions of sucres)

Sector, subsector and headings	Damage			Import/export component a/
	Total	Direct	Indirect	
Total	1 794	335	1 459	731
Agricultural sector	1 633	180	1 453	731
Losses of capital	180	180	-	-
- Eroded/silted lands (400 hectares)	40	40	-	-
- Infraestructure including irrigation works	127	127	-	-
- Products in storage	13	13	-	5
Production losses (through abandonment or lack of access)	1 063	-	1 063	726
- Coffe (20 000 hectares)	751	-	751	726
- African palm	140	-	140	-
- Corn, beans	95	-	95	-
- Green oranges	67	-	67	-
- Other products	10	-	10	-
Emergency crop programmes	390	-	390	-
Livestock sector	161	155	6	-
Losses of capital	155	155	-	-
- 3 000 head of cattle	105	105	-	-
- Lost/silted up pasture land (2 500 hectares)	50	50	-	-
Losses from reduced milk production owing to lack of access	6	-	6	-

Source: ECLAC, based on figures provided by the Ministry of Agriculture and other sources.

a/ Import or export requirements which cannot be met.

Chart 2
EVALUATION OF PHYSICAL AND ECONOMIC DAMAGE TO AGRICULTURE, BY REGION AND ZONE

	Area planted prior to hurricane	Area affected: General total		Totally		Partially		Value of losses at farm level a/ (thousands of DLLs.)	Percentage structure %
		Hectares	%	Hectares	%	Hectares	%		
National total	475 502	202 239	42.5	84 357	17.7	117 002	24.3	257 127	100 0
Central region	61 451	48 075	78 2	30 067	40 9	10 003	29 3	143 706	55 9
South-western region	56 621	17 826	31 5	9 355	16.5	6 471	15.0	13 994	5 4
Southern region	46 317	12 253	26 5	5 232	11 3	7 021	15 2	15 010	6 2
Eastern region	34 169	21 325	62.4	6 926	20.3	14 399	42.1	10 334	4.2
Northern region	117 393	37 301	31 0	14 303	12 2	22 998	19 6	43 392	16 9
Northwestern region	30 657	11 007	36.1	4 794	15.6	6 293	20 5	3 422	1.3
Northeastern region	128 984	54 292	42.1	13 600	10.5	40 692	31.6	26 360	10 3

Source: Secretary of State for Agriculture

Note Percentages are calculated with respect to the area planted prior to the hurricanes.

a/ Includes capital replacement costs --which, in the case of permanent crops, will be spread over several years-- but does not include loss of stockpiles nor the effects of production stoppages, so that these figures do not necessarily coincide with those of chart 1, Section II of this Chapter (Buildings and industrial installations, by type of business)

Chart 3

DAMAGE TO CAPITAL PROPERTY AT FARM LEVEL

Concept	Description of damage	Cost
1. Affected land	35 hectares covered by sand, totally lost	
	150 hectares covered by debris, but recoverable	
2. Irrigation and drainage system	100 km of primary canals 750 km of secondary canals 210 km of clogged drains	
3. Destroyed machinery and equipment	10 tractors 2 planters 3 pumps 5 trailers 1 pickup truck 7 spray pumps Diverse equipment	
4. Lost products and inputs	21 tonnes of corn 5 tonnes of corn seed 50 sacks of fertilizer 1 500 lt of gasoline 17 000 burlap sacks	
5. Other production goods	16 mules 70 bails of hay, etc	
6. Buildings and installations	1 silo of 700 m^2, built of concrete and brick 2 adobe silos of 950 m^2 1 run down milking shed, etc.	

Chart 4
DAMAGE TO INFRASTRUCTURE

Concept	Description of damage	Cost
1. Access roads	70 km of gravel access road in bad condition	
	2 Bailey bridges of 22 m long, destroyed	
2. Infrastructure	6 km of main line, destroyed from post 14 to post 27	
	7 intakes, with their equipment	
	800 m of electrical line	
	20 telephone posts	
	1 transformer, etc.	

Chart 5
NUTRITION APPRAISAL

Product	Consumption per inhabitant (kg)	Total consumption (t) 1/	Total post-disaster production (t)	Donations (t)	Necessary allocations (t)	Costs (thousands of ha.)
Corn	125	875 000	670 000	200 000 2/	205 000	205 000
Beans	30	210 000	200 000	3/	10 000	30 000
Sorghum	-	-	-	-	-	-
Rice	-	-	-	- 5/	-	-
Wheat	-	-	-	- 4/	-	-

1/ On the basis of a population of 7 million.

2/ Donation via Public Law 480 of the Government of the United States.

3/ Different donations form friendly countries.

4/ Donation from the World Food Programme (WFP).

5/ Cash donation for the purchase of rice from the Government of the Federal Republic of Germany.

Chart 6
PRICES OF SOME FARM PRODUCTS

Category and characteristics	Price a/
Category and characteristics	16 760
Tractors	20 590
Ford 6600 77 Hp	23 675
Ford 6610 84 Hp (Imported)	40335
Ford 6610 103 Hp (Imported)	
Certified seed (tonnes)b/	
Corn	310
Beans	285
Silage sorghum	175
Grain sorghum	329
Rice	136
Soybeans	274
Wheat	114
Chemicals and insecticides (tonnes)	
Methilic paration 80%	2 170
DDT 100%	1052
DDT 75%	1 276
BHC	469
Toxafero	789
Fertilizers (tonnes)	
Urea (bulk)	88
(in sacks)	102
Ammonium nitrate (bulk)	70
(in sacks)	81
Ammonium phosphate (bulk)	197
(in sacks)	224
Ammonium sulphate (bulk)	46
(in sacks)	56
Phosphoric acid (bulk)	166
Anhydrous ammonium (bulk)	91
Triple phosphate (bulk)	109
(in sacks)	123
Simple superphosphate (bulk)	46
(in sacks)	54
Potassium chloride (bulk)	110
(in sacks)	125
Potassium phosphate (bulk)	199
(in sacks)	213
Potassium nitrate (bulk)	241
(in sacks)	254
Complex fertilizers	
20-10-10 (bulk)	121
(in sacks)	138
(18-12-106 (bulk)	103
(in sacks)	121
17-17-17 (bulk)	165
(in sacks)	185

a/ At Mexican market prices, $2 281 00 pesos per dollar.

b/ Certified seed price during the 1987 Spring-Summer cycle