IV. EDUCATION SECTOR

1. INTRODUCTION

a. Definition, conceptual and institutional aspects

This section presents a methodology for evaluating damage caused to the physical infrastructure and equipment of the education sector. By physical infrastructure is meant all those buildings used for normal and adult education (class rooms, laboratories, workshops, etc.) and auxiliary installations (sanitary services, general services, libraries, etc.) For the purposes of this manual, other installations linked to scientific and educational activities, such as museums, archives and public libraries, are also considered within this sector Installations which are an integral part of other productive or social sectors, such as libraries and training class rooms in hospitals or in manufacturing industries are not included here Likewise, the buildings already accounted for in other sectors, such as housing for teaching or administrative personnel, are not included here

The education sector fulfills the main function of ensuring the formation of human resources and the promotion of scientific and cultural activities which contribute to the social and economic development of countries. In this context, the capacity and quality of educational infrastructure are decisive in the achievement of steady progress in the sector.

The responsibility for creating norms and maintaining statistical registers of educational institutions lies mainly with central government bodies (Ministry of Education, Agency for Educational Constructions, etc) or in regional and local government (Municipalities). The ownership, operation and maintenance of educational institutions in Latin America and the Caribbean is both public and private, varying in composition from country to country and level to level (primary, secondary, university, etc.).

Specially in rural or low income urban areas, some schools fulfill additional functions, such as serving as centres for community and cultural activities. In other cases, the opposite situation prevails and public installations (churches, community centres, etc) are used for educational activities

Although statistical information evaluating the relative importance of the construction of educational buildings, within total construction sector activity –as normally defined in the national accounts–, is not available, it is generally recognized that it is not as significant as housing construction or other civil engineering works

It is equally important to mention that schools are usually used as emergency or temporary shelters after the occurrence of natural disasters which damage housing extensively. For that reason, it may be that the national "civil defense" systems also

possess detailed information about the inventory of schools (or about education, in general) in a given country.

Museums, libraries and archives in Latin America and the Caribbean are mainly public property and are generally found in urban areas; however, there are a few cases in which they are private property or are located in rural zones. The number of museums, libraries and archives in the region is relatively small, so that it is easy to identify and characterize them individually.

What has been said indicates that the evaluation of damage in the education sector is mainly of interest to the authorities responsible for its planning and administration, although it is also of interest to central planning and civil defense organisms.

b. Evaluation methodology and its application

The methodology to be used in the evaluation of education sector damage is very similar to that applied in the housing sector. Therefore, this chapter makes frequent reference to that sector.

As is true for the other sectors dealt with in this manual, the process of evaluation of this sector should make it possible to quantify indicators, which should be summarized in the matrix presented in Chart 1.

The heterogeneity of education sector equipment considered in this manual (schools, adult educational centres, museums, archives and public libraries) makes it necessary to apply a small number of indicators or units of damage assessment, so as to produce results compatible with the type of information managed by the corresponding planning or sector administration organisms. For example, in simple terms, schools consist of the following elements: class rooms; other teaching spaces (laboratories, work shops, etc.); spaces not dedicated to teaching (administration, hall ways, libraries, etc.) and paved and sports areas. However, educational statistics are generally presented only in terms of the number of class rooms, square meters constructed (total or only those dedicated to teaching), or the number of students enrolled (total or by shifts).

The diversity of schools also makes it difficult to compile detailed statistical records of furnishings and equipment. As in the housing sector, their composition and average value should be estimated for each construction unit selected (square meter constructed or average class room).

Museums, libraries and archives are too diverse to allow for reduction to standardized units of measurement. The same holds true for furnishings, equipment and inventories of printed scientific and artistic works. In that case, it will be necessary to define units of measurement and assign them independent values for each installation. Works of art or of historical value, whose monetary value is more difficult to express, present an additional problem, when they have been totally destroyed.

As in the case of housing, it is recommended that the following steps be taken –nearly simultaneously, given the brief time available– to evaluate the education sector:

i. Definition of the area affected by the disaster;
ii. evaluation of the situation prior to the disaster;
iii. identification of direct damage/effects;
iv. assessment of direct damage/effects;
v. appraisal/costs of direct damage/effects,
vi. identification of indirect damage/effects;
vii. assessment of indirect damage/effects,
viii appraisal/assessment of indirect damage/effects;
ix. identification of secondary effects;
x. evaluation of secondary effects,
xi. preparation of comments on the main damage to educational installations, their typology and physical and socioeconomic context;
xii. preparation of comments on reconstruction works/projects, their duration and possible budget; and
xiii. identification of those sector areas which need aid for reconstruction works

c. Definition of the area affected by the disaster

It is recommended that the same steps as those indicated for the housing sector be followed. The entities responsible for the educational and cultural development sectors should also be consulted

d. Evaluation of the situation prior to the disaster

The evaluation of the condition of education sector equipment prior to the disaster requires the following minimum information:

i. Schools (schools, centres for adult training and Universities).

- Number of teaching establishments in the affected zone, classified by urban-rural and privately or publicly owned;
- Number of class rooms and students (total and/or by shift) by educational establishment,
- The quality (construction) of existing teaching establishments. This may be estimated on the basis of data, such as

- construction materials used (brick, adobe, wood, concrete, etc.);
- the age of the building, and
- the condition of the building (very good, fair, poor, etc)

ii. Museums, libraries and archives

- number of installations in the affected zone, classified by. urban-rural and privately or publicly owned,
- nature of the collections (content) in those installations (see classification in Section 2) and number of works or volumes;
- average area (or "volume" if the type of building justifies it) of the installations.

Other data must also be gathered with respect to·

- number of teaching establishments, classified by educational level: pre-school and primary, secondary, University and other categories of adult education;
- typical furnishings and equipment of teaching establishments or according to diverse categories of establishments, such as those indicated in the preceding paragraph;
- inventories of the furnishings and equipment of museums, libraries and archives,
- construction, furnishings and equipment costs:
- at current market prices,
- at factor cost (market prices, excluding indirect taxes) (see "Housing Sector", Part Two, Chapter II, for criteria to be applied in the determination of costs).

e. Sources of information

Information about conditions in the education sector in the country and/or the zone affected by the disaster is usually found in the same sources as for the housing sector Other particularly important sources for the education sector are·

- the Ministry of Education,
- public institutions (Councils, Centres, Institutes, Committees, etc.) responsible for the construction and administration of teaching establishments,
- public institutions responsible for the coordination of University and adult education;
- religious and private entities which administer educational centres,
- insurance companies, specially in the case of museums, libraries and archives,

- periodic censuses of the education sector;
- statistical annuals of the United Nations Organization for Education, Science and Culture (UNESCO);
- UNESCO statistical summary (annual publication).

2. DIRECT DAMAGE OR EFFECTS

a. Introduction

As defined for this manual, direct effects refer basically to loss of capital or property. In the education sector, this includes the partial or total destruction of buildings, furnishings, equipment and the material, works or printed volumes (in the case of museums, libraries and archives) in the buildings affected.

The way in which these elements suffer damage in different types of natural disasters is very similar to that which affects the housing sector; therefore, that matter will not be repeated in this section.

b. Classification of sector equipment

i. **Teaching establishments**. Because the brief time available for evaluating damage makes detailed inspection of all teaching establishments difficult, the evaluator should attempt to study the greatest number of representative cases possible and extrapolate those findings to the universe of damaged units. Unfortunately, countries do not have uniform construction typologies for teaching establishments, with the possible exception of public schools. Other teaching establishments are generally of diverse design and construction quality, there being many cases in which they are residential buildings or were constructed for other purposes and have been adapted subsequently to serve as teaching establishments.

If the magnitude of the damage and restrictions on inspections within the affected zone make it necessary to establish "typologies" of teaching establishments, they may be defined on the basis of educational levels, most commonly used construction materials and the quality or condition of the buildings (in the latter case, building age could be used). The application of the first criterion is based on the assumption that teaching establishments of the same educational level will have similar "areas" or "spaces" for teaching, non-teaching and recreational activities. The building materials employed will serve to determine the unit cost of construction and the quality of the construction will allow for making very sweeping distinctions between that damage arising from obsolescence or poor maintenance and that which is properly due to the natural disaster.

The norms which regulate the construction and operation of teaching establishments vary considerably from country to country within the region By way of example, it is worth noting that the requirements for space, both for primary and secondary schools, oscillate between:[4]

- Total surface built = 6 (Argentina) to 1.2 (Paraguay)
- Class room area = 1 5 (Uruguay, Peru) to 0 9 (Guyana, Haiti)

The ranges for spatial norms for other educational installations are similar:[5]

♦ Administrative spaces:	0 85 (Argentina) to	0.5 (Bolivia)
• Laboratories:	3 8 (Ecuador) to	1.2 (Dominican Republic)
• Technical-manual workshops	5 (Peru) to	1 2 (Uruguay)
• Art workshops	6 (Paraguay) to	1 5 (Uruguay-Peru)
• Industrial workshops	9 (Guyana) to	4.5 (Guatemala)
• Libraries	4.32 (Brazil) to	0.15 (Bolivia)
• Music rooms	2.7 (Paraguay) to	1.2 (Argentina)

The spatial norms stipulated (although not always applied) by the countries of the region are usually differentiated by school level and locality (urban or rural). If necessary, the evaluator should obtain the norms applicable to the installations in the zone affected by the disaster and verify their validity (or the deviations which may exist, in fact) with regard to local conditions, basing his/her conclusions on direct inspection and interviews with the authorities and those responsible for those educational installations.

As mentioned above, the spaces and equipment used in adult and University educational installations are so varied that it is very difficult to define average dimensions for general application. For that reason, it will be necessary to evaluate case by case, or define certain typologies on the basis of evaluator observations. The norms and factors presented above may serve as the basis for evaluator conformation of the typologies of the adult and University installations to be inspected.

ii. **Libraries, museums and archives**. This type of installation will usually be identified and studied individually, due to the specificity of their function and architectonic design. Some definitions which may assist the evaluator in the

[4] Expressed in squares meters per student

[5] See "Construcciones escolares· Criterios y normas utilizados en América Latina y el Caribe," UNESCO, Santiago, Chile 1983

identification and/or classification of these units, in a manner compatible with the available information in the country or the international sources of information, are the following:

- National libraries: those responsible for the acquisition and preservation of copies of all the publications printed in the country and which function as "depositories", usually elaborating a national bibliography.
- Specialized libraries: those which are part of an association, official service, research centre, or other organism whose collections basically cover a discipline or particular branch of science or culture (excluding school and University libraries or those located in industrial and commercial institutions).
- Public libraries: those at the service of the community, specially at regional or local levels.

Museums are usually defined as permanent non-profit institutions, at the service of society and its development, open to the public, which perform research into the material testimony of human history and environment, displayed for the purposes of study, education, and enjoyment. The International Council of Museums (ICOM) and UNESCO classify museums according to the predominant nature of their expositions and collections: of art; archaeology and history; history and natural science; science and technology; ethnography and anthropology; specialized collections (in an area not covered by the preceding categories); regional; general and others. Moreover, this category also includes historical monuments and protected archaeological sites, together with zoos and botanical gardens, aquariums and natural reserve parks.

Archives are defined as every institution, the main function of which is the preservation of archives (conventional documents, cartographic documents, audiovisual, microcopy and other materials) and the organization of those collections for use by persons other than the members of the institution. For statistical purposes, archives may be classified according to the main content of their collections, as indicated at the beginning of this paragraph.

On the basis of what has been indicated, education sector information can be summarized within the framework provided by Charts 2 and 3; that is, the evaluator should gather the information which will make it possible to fill in those Charts. In the case of teaching establishments, "individual record cards" for each establishment, containing the minimum information required by Chart 2, should be prepared.

c. Damaged equipment

In order to calculate damage to education sector installations with a certain degree of precision, it will be necessary to open them into their basic components: buildings, furnishings, equipment and inventories of works or collections.

i. **Buildings, furnishings and equipment**. These components may have been totally or partially destroyed, depending on the intensity of the natural phenomenon. The description of those components and the types of damage they may suffer are similar to those of the housing sector. The evaluator may refer to the appropriate chapter for further information on this matter.

It is necessary to clarify that, in the case of the education sector, all those instruments, implements and equipment used in the development of the main function of the institution under study (for example, in teaching establishments, laboratory equipment and manual workshops, sports installations, etc.), or which are necessary for the processing or direct use of the works stored there (for example, in libraries, museums and archives, micro-film viewers, computers, projectors, etc.) are considered under the heading "furnishings". This type of unit has usually been inventoried on an individual basis.

In contrast to the components mentioned above, "equipment" refers to those installations which are additional to the normal interior installations (water, sewage, etc) and which are complementary elements to the building itself (elevators, security, air conditioning, internal communications systems, etc.).

ii. **Inventory of materials, works and collections**. It may occur that some installations of the education sector contain important inventories of materials (paper, chemical products, etc.) in fulfillment of their functions and which, due to their cost or volume, should be considered in the evaluation of damages.

It will, moreover, be necessary to quantify and appraise the inventories of works and collections found in certain buildings This appraisal will include the books contained in a library, the works of art, displays and pieces which constitute a museum's collection, the documentation of an archive, etc.

Those elements may have been damaged by a natural phenomenon and may have been totally or partially destroyed. In the case of the former elements (materials), they can usually be easily obtained in the market and, therefore, their replacement cost can be obtained or calculated rapidly. However, the situation is different in the case of inventories of documents, objects or works which are part of library, museum or archival collections. First, they may be difficult (or impossible) to repair, restore or replace, as in the case of unique or irreplaceable works. Moreover, it may be very difficult to appraise objects of subjective value or which are not traded openly on the market, as is the case of works of art or of historical value

It is nearly impossible to establish general criteria for the appraisal of inventories of materials, works and collections; therefore, the evaluator will be forced to make a case by case analysis of the affected installations, with recourse to the information provided by specialists, appraisal agencies, insurance companies, etc.

iii. **Other aspects to be considered in the identification of direct damage to education sector equipment**.

Other direct damage. As in the case of "housing", in addition to the necessary replacement or rehabilitation work on the buildings, furnishings, equipment and inventories so that the installation (school, museum, library, etc.) repaired or replaced will be "equivalent" to that which existed previously, the appraisal of which will be considered within the direct damage, such as the reconnection of public services (drinking water, sewage, gas, electricity, telecommunications, etc.), demolition works and the removal of debris and other accumulated materials (mud, water, etc).

Imported component. The evaluator should identify, list separately and appraise the imported materials and products which will be used in the repair or replacement of damaged installations. For greater clarity in this regard, see the "housing sector".

d. Assessment of damage

i. **Buildings, furnishings, equipment and inventories** The basic criterion to be applied in the assessment of damage is that their quantification, as a basis for their subsequent repair or replacement, must lead to the production of an installation (school, University, museum, etc.) or element of an installation which will be functionally (in the case of furnishings, equipment, etc.) and intrinsically (in the case of documents, publications, etc.) equivalent to that which existed prior to the disaster Works of art or irreplaceable works should be appraised at their value at the moment of the disaster as a net loss

Chart 4 shows possible ways of quantifying the magnitude of the damage suffered by education sector installations globally. In this case, due to the diverse typology and variety of the installations involved, it does not seem worthwhile (or possible in the limited time available for the evaluation) to make a detailed cost analysis on the basis of the quantification of inputs (labour, materials, equipment) for each element of each installation. However, evaluators should have recourse to that type of analysis when they deem it appropriate. In that case, charts similar to those used for the housing sector may be useful.

ii. **Partial or total demolition**. As explained above, damage to education sector installations may make their partial or total demolition necessary, as a preparatory step for repair or replacement works. The quantification of demolition works should be performed in global terms, that is, per square meter constructed, which, if necessary, may be converted into volume (thus using measuring units easily made compatible with the assessment of debris removal) or construction units (class rooms, workshops, etc.), if they can be normalized and are sufficiently numerous to justify that type of treatment

iii **Debris removal**. As indicated for the housing sector, in this section only "the removal of debris or of material deposited during the disaster (mud, ash, etc.) necessary to begin repair or replacement works" will be considered. Activities which are part of the emergency phase are not included

e. Assessment of direct damage or effects

i. **General criterion**. The unit prices to be applied to the "quantities" of direct damage –as indicated in Chart 4– correspond to those valid at the time of the disaster They should be market prices, under normal conditions; that is, excluding possible distortions arising from speculative or inflationary situations generated by the disaster itself. The prices used should include all necessary costs (administrative, financial, etc.) so that inputs (labour, material or equipment, if it is decided to assess in such detail) be incorporated into the repair or replacement works; or so that the unit measured (m2 built, furnishings unit, etc) constitute an integral part of the finished work.

Prices of imported material and equipment are to be determined in the same way, according to information provided by suppliers Otherwise, CIF prices should be obtained (which include transport and insurance to destination), to which those domestic costs, which are necessary so that the input be incorporated into the repair or replacement work, should be added.

ii. **Building, furnishings, equipment and reconnection to services**. For ease in calculation, the ideal situation would be a set of homogeneous buildings, in which all square meters constructed would have the same intrinsic characteristics and, therefore, the same value. Given that this is not the situation, in the education sector, there are two ways or methods of assessment available. assume an average value per unit of building, based on the relative weight (evaluation) and average value of each type of space (class rooms, sanitary services, administrative spaces, etc); or allocate a value to each type of space and, then, add up the total for the whole building. Experience has shown that the first method is the more commonly used, in spite of its being less precise, given the time limitations on this type of evaluation.

In the case of museums, libraries and archives, it is difficult to provide parameters for construction costs, given the diversity of the typology, therefore, the evaluator should evaluate those costs on the basis of field observations.

Certain generalizations can be made for teaching establishments, based on the circumstances in each case. For example, costs for school buildings may range between US$ 150 and US$ 250 per m2, according to local conditions and the types of space involved. If more detailed types of spaces is desired, tables of relative costs should be elaborated, taking into account the construction materials to be used, the interior installations, open spaces, etc. Chart 5, "Building cost coefficients in school buildings", contains an example, which is presented as a point of reference only.

The criteria to be applied in the assessment of furnishings are similar to those indicated for buildings. Given that the assessment will be based on a percentage of the furnishings damaged, it will be necessary to estimate the average value of the total furnishings, which may be made per installation or part thereof. Once again, in the case of museums, libraries and archives, it will be necessary to assess on a case by case basis. For school establishments, a certain level of generalization may be possible, if the situation permits. An example of relative furnishings costs is presented in Chart 6 The coefficients were calculated on the basis of furnishings costs for an average class room (it must be noted that what this manual refers to as furnishings is known, in educational literature, as "equipment").

For the assessment of equipment, reconnections to services, and the demolition and removal of debris, specific analyses for each case will be necessary, in general, along the lines indicated for the housing sector

3. INDIRECT EFFECTS

a. General observations

Together with capital and property losses due to the destruction of education sector installations, there are other effects, classified as indirect, related to.

i. the costs (beyond the direct costs discussed above) necessary to obtain an installation equivalent to that which existed before the disaster;

ii. the damage suffered by educational installations after the disaster, as a result of action taken in direct relation to the disaster (for example, prolonged use of school establishments as temporary shelters, storage centres or administrative offices);

iii other losses to the income flows of institutions or the nation arising from the suspension or reduction of services lent, as a result of the direct damage sustained by education sector installations.

Indirect effects should be expressed as costs and added to the direct effects, in order to calculate total damage. In the same way, they should be classified as urban, rural, public, and private

Chart 7 displays those indirect effects which should normally be considered in damage evaluations.

b. Assessment and appraisal of indirect effects

i. **Stabilization of land and protection of buildings** These indirect effects refer to costs arising from works undertaken in addition to the reconstruction or repair of

buildings, which are necessary to ensure the quality and permanence of the restored buildings.

As was the case for housing, this category includes land stabilization works, the construction of additional flood protection structures, etc. The criteria for quantification and assessment to be applied are similar to those utilized in the housing sector; therefore, the evaluator may refer to the appropriate section for further information in this regard.

ii. **Relocation of sector installations**. In this section, costs arising from the relocation of education sector installations, currently situated in dangerous surroundings or those vulnerable to future disasters, are included In the case of the education sector, these costs refer basically to moving furnishings and stockpiles; the costs of preparing the land to be occupied, the cost of the land and all administrative, legal financial. etc costs necessary to undertake the actions indicated above. It is necessary to repeat that, in this section, the costs of the construction of new buildings (even though in different locations) are not considered, given that they are covered among the direct effects. One extremely rare exception will arise in those cases in which costs for building construction in another location are so different with respect to reconstruction costs on the original site that the calculation of the difference as an additional indirect cost is justified.

It is recommended that the installation (school, library, museum etc.) be taken as the basic unit of measurement; however, if deemed necessary, costs may be presented in terms of the capacity of the installation in question (for example, cost per student or per school space).

For the assessment and appraisal of these indirect effects, the same criteria as those used for the housing sector should be applied.

iii. **Damage caused by ulterior use of education sector installations**. As indicated above, education sector installations, specially school installations which resisted the effects of the natural disaster, are occasionally and temporarily used as family shelters, materials and equipment depositories, or as administrative offices. Experience has shown that this use of school establishments often causes significant damage to interior installations, non-structural elements and the furnishings of the affected installations

Much of this damage may be evident at the time of the evaluation mission; however, other damage will only come to light over time The evaluator faces the task of estimating the quantity of damage which will have been done by the end of the provisional occupation of the installations and, then, of assessing them.

The methodology to be applied in the measurement and assessment of this damage is similar to that used for the calculation of direct damage, with regard to the repair or replacement of the affected installations

iv. **Additional transportation needs**. This cost category will be applied mainly to teaching establishments. These costs arise from the additional transportation expenses incurred by students and teaching personnel when traveling to provisional or relocated teaching establishments Those costs are usually assumed by families (private cost), however, it may happen that the public sector will cover part or all of them (public cost) It is recommended that the student or individual be taken as the unit of measurement The evaluator will thus be able to estimate the average additional daily cost per person (or student, etc) and, then, add it, if necessary, to the cost per school establishment. The daily additional expense per person is multiplied by the number of days estimated for the return to a normal situation. If it is foreseen that these additional expenses are going to assume a more permanent character, the evaluator will establish a time limit for the sum of these costs (one or two years), assuming that, after that period, transportation costs will reflect other socioeconomic variables, as well as with those related to the disaster itself.

v. **Loss of income to institutions due to the interruption or reduction of their services**. Education sector installations play the basic role of promoting education and culture, to which end they operate as service-lending institutions. In many cases, they receive net income which makes them operationally similar to any other commercial institution offering services. In other cases, operating costs are assumed by the public sector. Thus, for example, teaching establishments will collect monthly fees from students or, will otherwise finance operating costs; museums will charge entry fees and, in some cases, archives and libraries will do the same.

When a natural disaster occurs, it may happen that, due to the damage suffered by education sector installations, or for other reasons of diverse nature (for example, the alternative use of installations), those establishments temporarily cease to operate, thus interrupting the services and, therefore, their income flows. The most practical, although not the most precise, way of expressing that absence of income is through the calculation of the salaries of those who work in those establishments and who, if they become unemployed, will reflect the damage of ceasing to offer those services and, if they remain employed, will indicate the cost lost, because the service is not actually provided.

To estimate this cost, the evaluator should determine the average salary of personnel who work in institutions which have ceased to provide services and multiply that amount by the number of affected persons and the number of days the interruption of those services is expected to last

vi **Loss of public sector income from unpaid taxes or fees related to the income of affected institutions**. It may happen that some education sector institutions, specially those of the private sector, generate State income by paying taxes (training centres, private museums, etc.) or by transferring part of their incomes (public museums and archives, etc.).

When some education sector institutions are totally or partially destroyed and cease to operate, they may also cease paying taxes or making transfers to the central government.

In order to estimate those losses, the evaluator should calculate the amount of taxes the affected installations would pay during the period for which it is expected that they will be inoperative or for the period during which the government has granted them tax exemptions, if such is the case It seems important to note that this factor will only be significant when direct damage is also of great magnitude; therefore, the evaluator should judge its relative importance within overall damage and, consequently, the amount of work (or time) which he/she should dedicate to its accurate evaluation

The appraisal of the indirect damage calculated in this section will also be an important factor in the calculation of the secondary effects on the gross domestic product and public sector finances, always subject to the considerations of magnitude mentioned in the previous paragraph

vii. **Other additional operating costs**. Finally, it may happen that education sector institutions may incur additional expenses in their efforts to maintain the normal provision of services in the face of irregular external conditions An example of this situation is when schools are forced to work night shifts or during vacation periods, implying additional expenses for the consumption of energy or payment of overtime and benefits for teaching and administrative personnel.

As indicated elsewhere, the evaluator should decide whether the volume of this type of damage justifies assessment and appraisal and the investment of time which its estimate would require.

The total appraisal of those indirect effects should take into account the volume of additional inputs required under irregular operating conditions, their unit costs, and the time that irregular situation is expected to last.

4. SECONDARY EFFECTS

The destruction of education sector installations produces secondary effects on the economic and social conditions of the affected population and country which become evident some time after the disaster. Those effects should not be added to the direct and indirect effects.

Some particularly relevant secondary effects of the destruction of education sector installations are presented below:

i Lost contribution to the national economy of income or production generated by the education sector;

ii. Variations in employment rates;

iii Impact on the balance of payments;

iv. Impact on the public sector; and

v Impact on inflation.

a. Lost contribution to the national economy of income or production generated by the education sector

Education sector institutions generate income (as expressed in the national accounts) which is normally included in the personal services sector.

To calculate it, institutions may be classified as: private for profit, non-profit, and public institutions. It is acceptable to measure income in terms of the "production" of those institutions, which, in the case of private profit-oriented institutions, means applying a methodology similar to that used for industrial establishments, according to the recommendations of national accounts systems.

Given difficulties in measuring the production of education sector institutions directly, the common practice of assessing it in relation to its inputs is recommended. This is done by taking estimated quantities of both primary and intermediate inputs, multiplying them by estimated unit prices and the time period the suspension of services is expected to last.

The evaluator should take care to avoid calculating interruptions of normal working hours (or periods) which are already being (or will be) provided for in extraordinary operational periods (prolonged school year, night shifts in other installations) as secondary effects.

b. Variations in employment rates

A disaster may affect the employment rate in the education sector, leaving the personnel of the affected institutions unemployed for long periods.

This section is limited to the evaluation of variations in the number of work positions available , given that the costs of lost positions were considered as a factor in lost earnings, under indirect effects.

c. Impact on the balance of payments

The destruction of education sector installations and subsequent repair and reconstruction works may have considerable impact on the country's volumes of imports and exports. Some of the possible flows of goods and services and of capital between the country and abroad, which may affect the balance of payments, are the following.

i. Imports of materials, components and equipment for the repair and reconstruction of buildings and equipment The additional imports required, as a result of the disaster, should be quantified. That appraisal should be based on the calculations made for the quantification and appraisal of the imports component of the direct damage.

ii. Foreign exchange income from loans and donations for emergency and reconstruction works This can be estimated on the basis of the costs of the emergency and the foreign currency component estimated for reconstruction projects.

iii. Foreign exchange income from reinsurance payments for damaged installations, and their inventories of works of art, collections, etc. In the case of buildings, total income from reinsurance payments may be very small; however, the situation may be very different in the case of historically valuable objects and collections, for which the amounts may be very high

iv. Foreign exchange losses from suspended exports, because national production of materials, components and equipment for education sector installations (example. cement, iron, hardware, furnishings, etc.), normally exported, will be used to cover reconstruction needs during the transition period

d. Impact on the public sector

The destruction of education sector installations and the subsequent repair and reconstruction works may have considerable impact on public sector finances. In this section, only two of the most relevant aspects will be discussed·

i Increased public sector outlay/investment· required for the implementation of reconstruction works in the education sector. This greater outlay can be calculated on the basis of the costs estimated for reconstruction projects.

ii. Lower public sector income due to reduced taxes collected or reduced transfers from totally or partially destroyed installations. Those values can be calculated as indicated earlier in this section

e. Impact on inflation

Normally, only a very rough estimate of the effects of the destruction of education sector installations and the need for reconstruction materials, on the prices of those products, can be made during the evaluation period. To that end, the evaluator can derive certain guidance by comparing prices prior to the disaster with those prevalent at the time of the evaluation. Future trends for the period considered relevant for the calculation of secondary effects must be evaluated jointly with the macroeconomist and the evaluator of the industrial sector, who will provide indications about the current availability of materials and the national capacity to produce and distribute them

A general recommendation for all sector evaluators is that they work very closely with the macroeconomist in order to obtain needed information and to establish uniform criteria for the calculation of the flows indicated above.

5. RECONSTRUCTION PERIOD AND WORKS

a. General recommendations

The purpose of including this section is to present a description of the special characteristics of education sector installations and their surroundings, within the disaster zone, which are believed to have been determinant in the magnitude and form of the damage suffered. The analysis of those characteristics will allow the analyst to make general recommendations for reconstruction works, including measures designed to prevent or mitigate the effects of new natural phenomena of similar intensity Finally, the inclusion in this chapter of an estimated calendar of activities and expenses for reconstruction activities is recommended, in order to guide the endeavours of the government and other aid organizations

The most common types of sector buildings (specially school buildings) in the affected zone and their weaknesses (structural and non-structural) resulting from the disaster are to be described. The construction materials most commonly used in the zone, their behaviour at the time of the disaster and their adequacy for the most common construction typologies should also be included. Finally, the placement of installations and their physical surroundings (soils, topography, etc), which may have affected their capacity to resist natural phenomena, should be indicated A brief list of recommendations about the most relevant aspects of the reconstruction process should be included in this section:

i. Technical characteristics of building repair, the processes to be applied and the types of materials to be used The same, with respect to the construction of new buildings and connected installations

ii. The location or relocation of buildings in accordance with the characteristics of their surroundings The need for ground preparation if it is impossible to relocate housing situated in vulnerable places

iii. Economic matters and inputs supply for reconstruction works.

iv Organizational and institutional issues related to the execution of reconstruction works (community participation, technical support, training, institutional coordination, etc.)

v List of projects for executing research and technical cooperation activities for the purpose of developing the above recommendations in greater depth and to support reconstruction works. Those projects should take five aspects into account. construction and repair techniques, costs and materials; institutional organization and coordination; location of buildings, and promotion of local economic activity

vi. List of reconstruction/rehabilitation projects, in which the required amounts of investment are to be indicated, together with possible sources of financing. national resources and foreign loans and donations.

b. Programming reconstruction works

The purpose of the programming of reconstruction works and their corresponding outlays is to present an hypothesis of the amounts and periods in which investments should be made, as well as estimating their impact on public sector finances and that sector's institutional capacity to execute those works.

The following aspects should be taken into account in the programming of reconstruction works

i the availability of economic resources and normal execution periods for the allocation and use of those resources;

ii institutional and organizational capacity for reconstruction works, taking into account the role to be played by the public and private sectors and civic organizations,

iii the supply of inputs for reconstruction works, including human resources, material and equipment, and in the awareness that, in some cases, these must be imported,

iv. the time needed for the design, planning and organization of reconstruction activities,

v. climatic and physical aspects (for example, the length of the rainy season which would impede reconstruction works, or the time needed to allow for the drainage of flood waters before reconstruction works can be undertaken), or aspects of sector planning (for example, periods of school vacations)

Evaluators should obtain information on these matters from public and private sector organizations, as well as from their own field observations during the evaluation. This information will allow for programming investment amounts for the education sector, in annual periods, for the entire reconstruction period, or for the period agreed upon according to the programming needs of the country under study

Chart 1
SUMMARY OF EFFECTS ON THE EDUCATION SECTOR

Effects of the disaster	Costs (Millions of monetary units)					Reconstruction or repair period (months)
	Total1/	Public	Private	Rural	Urban	
a Direct effects (i+ii)						
i - Repairs						
ii. - Replacement						
- Imported component 2/						
b Indirect effects						
c Sub Total (a+b)						
d. Secondary effects						

1/ The total cost results from to the sum of the costs for urban and rural categories, which will be equal to the sum of public and private costs

2/ The imported component refers both to repairs and replacements and, therefore, should not be added together.

Chart 2
CLASSIFICATION OF TEACHING ESTABLISHMENTS

Description 1/	School		Universities	Other
	Pre-school/Primary	Secondary		
Number of establishments.2/				
- Total				
- Rural				
- Urban				
- Public				
- Private				
Average capacity:				
- N° class rooms per establishment				
- N° students per establishment				
- shift				
Average area constructed				
- Per total establishment				
- Per class room				
Furnishings: - Good				
- Fair				
- Poor				
Equipment - Good				
- Fair				
- Poor				
Building: - Good				
- Fair				
- Poor				

1/ Individual information cards can be prepared for each teaching establishment, containing the minimum information indicated in this column, as well as the name and location of each school.

2/ The total number of rural and urban establishments will be equal to the total number of public and private establishments.

Chart 3
INFORMATION CARD FOR LIBRARIES, MUSEUMS AND ARCHIVES

1. Description	(museum library or archive)
2. Name:	
3. Location:	(city, region, etc and rural or urban)
4. Type of ownership:	(public or private)
5. Type of installation:	
- (Library.	national, specialized, public)
- - (Museum:	art; archaeology and history; history and natural sciences; science and technology; ethnography and anthropology; specialized (indicate type); regional and general)
- (Archives.	conventional; cartographic; audiovisual; microcopy and other)

6. Building.
   a) Total area constructed (and height for non-conventional buildings)
   b) Average age of the principal buildings
   c) Building condition (good, fair, poor)

7. Capacity:	(for libraries and archives. number of volumes or items For museums: according to the type of collection)
8. Furnishings:	Quantity and condition (good, fair, poor)
9 Equipment:	Quantity and condition (good, fair, poor)

Chart 4
COMPONENT UNITS OF MEASUREMENT FOR EDUCATION SECTOR
REPAIR OR REPLACEMENT WORKS (DIRECT DAMAGE)

Description of component			Unit of measurement
Building 1/			
-	Replacement		- m2 constructed (specify ceiling height if different from 2.5 - 3 m.)
-	Repair and reinforcement		- " " "
-	Repairs		- " " "
Furnishings			
-	Partial replacement:	Minor 2/	- Inventory of furnishings with minor damage (25% destruction)
		Major 2/	- Inventory of furnishings with major damage (50% destruction)
-	Total replacement		- Inventory of furnishings totally destroyed
Equipment			
-	Repairs	Minor	- Inventory of repair work on units of equipment with minor damage (25% destruction)
		Major	- Inventory of repair work on units of equipment with major damage (50% destruction)
-	Replacement		- Inventory of units of equipment to be replaced (totally destroyed)
Works, objects, collections			
-	Replacement		- Inventory of stock to be replaced
-	Restored		- Inventory of restoration tasks
-	Losses		- Inventory of works/stock impossible to restore or replace
Reconnection to services			- Number and type of reconnections
Demolition			- Cubic meter, square meter of building
Removal of debris/deposits			- Cubic meter of material to be removed

1/ Includes structure, non-structural elements and interior installations

2/ Includes possible repair tasks

Chart 5
BUILDING COST COEFFICIENTS FOR SCHOOL BUILDINGS

Type of space	Coefficient
General class rooms	0 92
Special class rooms	1.00
Laboratory	0 98
Sanitary services	2.02
General services	0.99
Library	0.98
Hallways	0 86
Administration	1.13

Chart 6

RELATIVE COSTS OF SCHOOL FURNISHINGS 1/ 2/

	Diversified secondary schools	COSTS
	Laboratories	Relative costs
1	Physics-biology	3 55
2	Chemistry	3 33
3	Multiple (triple)	4.88
	Workshops	Relative costs
1.	Bench and tool machine adjustment	13 27
2	Plastic arts	5 85
3	Carpentry	5.85
4	Cooking and food preservation (2 *)	1 86
5	Beauty styling (2 *)	2.03
6.	Electricity (area. 12 x 18 x 3.5 m)	5.91
7.	Electricity (12 x 18 x 3.5 m)	6.52
8	Clothing industry (4 *)	4.57
9.	Automotive mechanics (12 x 18 x 3 5 m)	7 63
10	Typing (3 *)	3 66
11.	Soldering and metal work (12 x 18 x 3.5 m)	7.36
	Others	Relative costs
1	Administration (3 *)	2.66
2	Audiovisual (4 *)	2 61
3	Library (4 *)	2 24
4	Storage (3 *)	1 56
5	Porter dwelling (80 m2)	2.20
	Diversified higher secondary schools	
	Laboratories	Relative costs
1	Clinical analysis (4 *)	6 46
2.	Biology and microbiology (4 *)	8 65
3	Mechanized accounting (5 *)	7 26
4	Physics (4 *)	5 52
5	Language (4 *)	4.26
6.	Chemistry (4 *)	5.75
	Workshops	Relative costs
1	Integral basic (12 x 24 m.)	21 49
2	Carpentry (12 x 24 m.)	7 68
3.	Drawing (4 *)	2 34
4	Electricity (12 x 24 x 3 5 m)	14.11
5	Electronic equipment and consoles Labvolt (12 x 24 x 3.5 m)	19 81
6.	Electromechanics (12 x 24 x 3 5 m.)	30 75
7.	Clothing industry (6 *)	6.30
8	Machines - tools	18.00
	Workshops	Relative costs
9	Vehicle mechanics	12 87
10	Typing (4 *)	3 21
11	Preparation and conservation of food products Milk/meats/fruit	32 50
	Others	Relative costs
1	Administration (6 *)	4.23
2.	Storage (12 x 24 x 3 5 m)	5.69
3	Audiovisual (6 *)	0.97
4	Library (4 *)	2.26
5	Guard post (1 *)	0 53

1/ Revista del Centro Regional de Construcciones Escolares para América Latina y el Caribe, N° 41, September, 1976

2/ In this manual, "furnishings" refers to what corresponds to "equipment" in school planning

All dimensions are expressed in square meters per student See "Construcciones escolares Criterios y normas utilizados en América Latina y el Caribe", UNESCO, Santiago, Chile, 1983

Chart 7
INDIRECT EFFECTS ON THE EDUCATION SECTOR

Description	Total cost 1/	Cost by category			
		Urban	Rural	Public	Private
Stabilization, protection of buildings					
Relocation of installations					
Ulterior damage/use of installations					
Additional transportation					
Institutions' income losses (public/private)					
Public sector income losses					
Other additional costs					

1/ The total cost results from the sum of the costs for the urban and rural categories, and will be equal to the sum of public and private costs.

Note. In the determination of costs, current market costs at the time of the disaster should be used.