

HOUSING RECONSTRUCTION IN THE CARIBBEAN AND IN LATIN AMERICA

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Introduction

In recent years we have seen the development of a renewed concern for the conflicts posed by the impact of uncontrolled urban growth in Latin America, the frequent occurrence of damaging disasters, and the lack of appropriate policies to guide reconstruction, to minimize adverse effects of emergency activities, and to promote the adoption of preventive and mitigating measures. This paper focuses on the problem of housing reconstruction and attempts to identify several issues that are key in the response to housing needs after natural disasters.

Housing is an important component of human life, its nature and form structure everyday life. Adequate, safe, and sanitary housing conditions are basic to health, productivity, personal well being, and self-esteem. Housing is a complex phenomenon that comprises not only the dwelling itself but also the necessary infrastructure and public utilities (electricity, water supply, sewage disposal, storm drainage, roads, transportation, communications), land use and land tenure, and access to employment and to social services (health, education). The form and organization of housing reflect cultural values, traditions, and the social organization of different groups.

Disaster impact and deficient housing conditions are two interrelated phenomena. The housing situation of the poor in Latin America and the Caribbean is a very critical problem. Shanty towns, slums, and marginal settlements are rapidly developing as a result of uncontrolled urbanization, uneven distribution of economic activities, and increasing differences in the distribution of income. It is estimated that in Latin America in 1970, 40 percent of the population lived under poverty conditions, that is, with an income that could not cover the cost of essential goods and services. That percentage supposes the existence of 113 million of poor people [Economic Commission of the United Nations for Latin America, 1980, p. 38]. In the Caribbean, per capita incomes for 1973 showed that the richest group of islands had an average income per head forty-five times that of the poorest. Thus, although there are relatively rich territories, the majority of Caribbean people are poor [Cross, 1979, p. 44].

Low-income settlements are plagued by problems of access to land tenure, high densities, deficient infrastructure, poor health, and lack of public services. In rural areas, the lack of services and infrastructure and the dispersed nature of settlements tend to aggravate the conditions of housing. Under "normal" conditions the poor are excluded from access to adequate housing through several mechanisms such as the distribution of service costs that prices services out of their reach; regulatory mechanisms like zoning and financing that excludes them; the costs of land, construction materials and labor that are beyond their ability to purchase; and requirements of high construction standards that place housing beyond their reach.

Despite its importance for human life housing is often treated as a residual category in the national plans of developing countries. Improvements in the housing sector are often regulated by national governments until a higher level of economic development is reached. Investment in housing, erroneously considered to be unproductive by government officials in many developing countries who disregard the significant impact of housing on income and employment through multiplier linkages [Grimes, 1976, p. 32], is often postponed in favor of investment in other sectors. However, waiting until a country reaches a certain level of development to address its housing needs may allow the deficit to reach intolerable proportions and it may jeopardize the development objectives of the country [United Nations Educational, Social, and Cultural Organization, 1977]. National development policies that increase regional imbalances by promoting a high concentration of industry, commerce, and amenities in major cities are factors that contribute to increased deficiencies in the housing sector.

Disasters and Human Settlements

Large areas in the Caribbean and Latin America are prone to disasters. Severe earthquakes, volcanic eruptions, droughts and floods bringing about heavy destruction were factors beyond control which inhibited growth even before the time of the Conquest. The Economic Commission of the United Nations for Latin America (ECLA) has estimated that the damage caused by natural disasters in the five countries of the Central American Common Market reduced the average annual growth rate of Gross Domestic Product (GDP) by approximately 2.3 percent over the 15 year period between 1960 and 1975 [United Nations, 1979, p. 2]. This figure does not take into account the indirect effects of disasters or the cumulative effect of many disasters of secondary importance whose overall impact is nevertheless substantial. For instance, there was an overall deficit of approximately \$200 million in Honduras during the two years following Hurricane Fifi--this figure is greater than the country's total gross annual investment (U.S. \$154 million in 1973) and is equivalent to four years of public investment. In Guatemala after the earthquake of 1976, the deficit increased six times in relation to 1975 [United Nations, 1979, p. 8].

Major disasters cause significant damages and losses to the housing sector of stricken countries. Conditions predominant in "normal" times are aggravated when a catastrophe occurs. Examples from Latin America in the past decades illustrate this phenomenon. The 1965 earthquake that

affected the central and most populated region of Chile destroyed approximately 8,500 houses and damaged 11,800 [Thompson and Thompson, 1976]. The 1971 earthquake that affected the same region destroyed approximately 25,300 houses and damaged 31,400 houses [Thompson and Thompson, 1976]. The earthquake that struck the north central region of Peru in 1970 destroyed over 70,000 houses [Doughty, 1980]. In the earthquake that struck Managua, Nicaragua, in 1972 it is estimated that a quarter of a million people lost their homes [Kreimer, 1978]. The storms and floods of June-July 1974 in the Central and Southern areas of Chile severely affected three important urban areas (Santiago, Valparaiso, and Concepcion), damaged and destroyed thousands of homes and disrupted the infrastructure [Agency for International Development, 1974]. About a million persons--a sixth of the population--found themselves homeless after the earthquake in Guatemala in 1976 [Kreimer, 1978]. After Hurricane Fifi in 1974 it is estimated that 10,000 people were made homeless in Honduras [Snarr, Neil, and Brown, 1978, p. 239]. It is estimated that approximately 125,000 housing units were destroyed or damaged in the Dominican Republic [Agency for International Development, 1981] and 80 percent of the houses were destroyed or damaged in the southern half of Dominica [Economic Commission for Latin America, 1979] as a result of Hurricanes David and Frederick in 1979. These disasters not only aggravated the shortage of dwellings, but the housing sector, considered in its broader definition, was affected. In all these cases damages to infrastructure (roads and bridges), to the power section (generating facilities, transmission and distribution network), and to the industrial sector were extensive. The economies were severely affected by the destruction of crops and livestock, the interruption of services, and the impact on production due to impairment of productive capacity.

The extent and nature of the damage to housing depends on the type of disaster (earthquake, floods, high winds, fires), the intensity of the impact, (the severity and magnitude of the earthquake, the velocity of winds, the extent of flooding), the construction materials used (adobe, tiles, bamboo, taquezal, timber, masonry, concrete, etc.), and the topographic location of buildings (in low lying plains, in ravines, coastal areas, near fault lines, etc.). In earthquakes, the distribution and intensity of damage is influenced chiefly by the type of construction, geometry, mass distribution, and degree of flexibility. During an earthquake, ground motion is transmitted to structures through their foundations. Unreinforced load-bearing walls of masonry or concrete construction are highly susceptible to earthquake damage because of their relatively low in-place shearing capacity. The strength of such walls is further reduced by window and door openings [Fattal, 1974, pp. 3-12]. Defects in foundations, wall construction, and roofing are a major cause of building failure in earthquakes. For instance, some of the construction defects that can be found in adobe houses--a material widely used in developing countries--are poor adobe-making techniques, use of insufficiently dried adobe, incomplete fill of the vertical points between adobe blocks, poorly aligned walls, poor interlocking wall intersections, and timber tie-beams connected with carelessly executed joints [United Nations, 1975, p. 110].

The damage associated with tropical cyclones results from the direct action of winds (e.g. during Hurricane David in the Caribbean winds

reached surface velocities of 150 miles per hour), from rainfall, and from storm surges [Simiu, 1974, pp. 28-37]. The critical wind pressure depends on the geometric characteristics of the house--configuration of the house, angle of the roof, configuration of the roof, connections between the roof and the walls, and between the walls and the ground--and on the arrangement of buildings in a group. Wind may cause a building to slide or overturn, and the storm surges and heavy rainfall characteristic of typhoons and hurricanes may cause floods that damage the foundation soil or the foundation itself [Simiu, 1974, pp. 28-37].

Housing Reconstruction

Disasters destroy considerable investments in housing and in some areas deplete the housing stock of low-income groups. Next, we will explore a number of issues that characterize the problem of housing reconstruction.

1. Predisaster housing conditions help to configurate the extent of post-disaster housing damage and needs.

The extent and characteristics of losses in the housing sector are not only consequences of each specific disaster agent, but also of the housing conditions prevalent before the disaster in the affected country. In Latin America and the Caribbean, substandard housing conditions are an endemic problem, an important component in the vulnerability of the population to hazards. Vulnerability can be defined as the susceptibility to loss of a population at risk when a hazard of a certain magnitude occurs [Committee on International Disaster Assistance, 1978, p. 43]. Population groups living in highly vulnerable conditions--poorly built houses located in unsafe areas, crowded, and lacking sanitation--are more likely to suffer damage and losses than groups who live in safer environments that facilitate their survival. Vulnerable conditions in normal times result in greater damage after disasters. For instance, accelerated urban growth in Latin America in recent years, massive urban migration, and the increased cost of urban land controlled by a speculative land market have accelerated the construction of settlements in vulnerable areas. In Kingston, Jamaica, new buildings are constructed on alluvial and unconsolidated soils, highly unstable in earthquakes [Burton et al., 1978, p. 14]. Inflammable materials, high densities, and limited accessibility for fire engines that often characterize squatter and marginal settlements increase the chances and intensities of fire incidences. About 95 percent of disaster-related deaths occur among the two-thirds of the world's population that occupy developing countries [Burton, et al., 1978, p. 14].

Figure 1 summarizes the relationship among predisaster and postdisaster components of housing reconstruction and indicates the interaction between hazards and socioeconomic conditions.

Disasters create a situation in which the demand for housing increases substantially and to which the supply side cannot adequately respond because of the prior shortages of housing, the constraints posed by the lack of institutional organizations to address the problem of low-

income housing, the control by market forces of costs of land and materials, and the polarization of resources in countries where those with certain means can respond to the needs posed by the disruption while the poor are confronted with restricted opportunities. For instance, the housing needs and the reconstruction process following Hurricanes David and Frederick in 1979 in the Dominican Republic were shaped by the deficiencies that affected the housing sector during normal times (i.e., a vast proportion of substandard housing, shortage of services and infrastructure, lack of a national policy for low-income housing, a housing strategy based on the provision of housing subsidies to the middle class). After the hurricanes the reconstruction process was hampered by all those factors and compounded by the lack of coordination between the agencies responsible for the development of specific sectors such as urban and rural housing, rural development, water provision, and land acquisition and distribution.

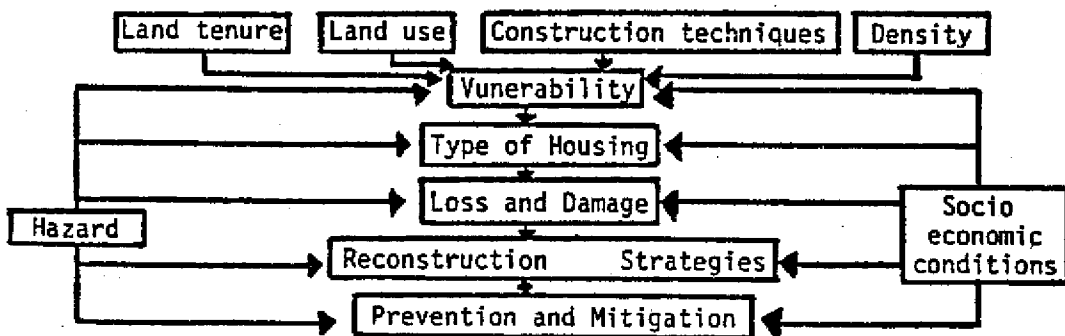


Figure 1

Interaction Among the Dimensions that Help Configure the Predisaster-post-Disaster Situation

It should be noted that the predisaster situation affects the postdisaster context at the level of the overall economy. According to a study conducted by the United Nations Disaster Relief Organization (UNDRO), the weaker the external situation in the country at the time of the disaster, the more acutely it will feel the effects on its balance of payments. In the case of Honduras, after Hurricane Fifi in 1974, while direct personal losses were estimated at U.S. \$150 million in 1974, it was estimated that exports of goods and services would decline by U.S. \$144 million in the same year and by U.S. \$115 million in the following year in relation to the anticipated performance (i.e. with no disaster) in 1974. At the same time, imports increased by some U.S. \$26 million

during these two years in order to meet the demand for priority consumer goods and as a result of the additional investments made necessary by the disaster [United Nations, 1979, p. 13].

2. The increased visibility of housing shortages caused by a disaster can bring about changes in housing.

Under "normal" conditions new housing in developing countries is usually planned and built very slowly for a small fraction of the population. Investment in housing is often delayed and the few housing programs that are implemented are addressed to economically stronger people. Even the programs that are designed to provide housing subsidies through low-interest loans or tax exemptions cannot be afforded by those groups whose incomes are too low to allow them to qualify. Low-income groups usually build their houses on the basis of high personal and kin-related labor time with occasional use of skilled labor for specialized tasks. Construction materials are rudimentary and in many cases do not have a commercial value and often land costs are avoided by the illegal occupation of unused land.

Disasters change these conditions. As mentioned above housing shortages are substantially aggravated. Housing deficiencies achieve visibility and usually there is an increased sensitivity on the part of the national government and the international community towards the social and political repercussions of housing shortages. Both the national government and the international community have to respond to the problem. Efforts to solve the housing shortage by national, bilateral and international agencies become concentrated in terms of time and capital investment. Disaster-stricken communities face problems requiring rapid and extensive departures from routine activities. In general they have great resourcefulness and adaptability and there is considerable spontaneous and highly organized social action [Committee on International Disaster Assistance, 1979]. Funds to build low-income housing, to subsidize construction materials, to form associations, and to create jobs become more easily available.

Housing losses and the increased visibility of the housing shortages can generate some positive actions. But also massive, uncoordinated responses from a number of agencies with different degrees of previous experience in the affected country and in disaster assistance, each of which has its own priorities and peculiarities, may hurt the victims they are intended to help. In addition, the use of relief and reconstruction as political tools by certain governments can have serious negative repercussions. The political manipulation of the reconstruction process by the government of Nicaragua after the 1972 earthquake is a case where the emergency was one of the factors that contributed to sharpen the tensions existent during the decade prior to the earthquake [Economic Commission of the United Nations for Latin America, 1979, p. 7].

3. The indirect effects of disasters, although often overlooked are sometimes as important for the housing process as the direct effects.

Indirect effects, although in many cases are not taken into account by damage assessment mechanisms, can be as important as the main effects

of the disaster [United Nations, 1979, p. 3]. The direct effects include losses of capital, destruction of housing, damage to infrastructure, loss of stocks, etc. Indirect effects can be varied and range from a reduction in family income to a reduction in the health of the population. Michel Lechat provides a good example of the importance of the indirect effects of a disaster in the increase of malaria in Haiti following Hurricane Fifi in 1963. That hurricane caused extensive damage to housing in Haiti, about 68 percent of the houses in the affected area were destroyed, and most of the roofs were blown away. The disaster occurred during the course of an extensive malaria eradication campaign and flushed away the residual insecticide that had been sprayed on the walls of dwellings. A severe malaria epidemic, involving about 75,000 victims, developed approximately two months after the hurricane. Haiti's subsequent problems with malaria may have been in some way related to the occurrence of this hurricane [Committee on International Disaster Assistance, 1978, p. 44].

4. In most cases, housing reconstruction strategies in Latin America and the Caribbean follow a repair or palliative approach rather than a preventive approach.

Disasters generate a substantial increase in the demand for housing and the postdisaster situation provides a very conducive context to adopt measures to prevent adverse effects of potential hazardous events. In a very hypothetical ideal case, major changes and the reduction of vulnerability in the reconstruction of the housing sector require not only the provision of housing to the homeless, but also the introduction of preventive measures in the development of housing. As shown in Figure 2, there are a number of options for addressing prevention in reconstruction.

Preventive measures vary substantially and they include non-structural methods (legalization of tenure, regulation of land use, definition of appropriate building codes and safety measures, training and technical assistance, etc.) and structural methods (improved construction techniques, improved land use, improved urban design, construction of dikes to prevent river flooding, etc.).

Reconstruction proceeded in the Dominican Republic after Hurricane David, in Peru after the 1970 earthquake, and in Nicaragua after the 1972 earthquake, without really implementing structural or non-structural measures that could have changed the reconstruction strategy from palliative to preventive. According to Ian Davis [1978, p. 36], one of the most disappointing aspects of the massive reconstruction effort in Guatemala has been the fact that virtually all the relief agencies have placed their emphasis on building large numbers of houses, ignoring the opportunity the disaster presented to instigate training procedures in safe construction.

In some cases, the introduction of new technologies not adapted to the hazard risk of an area can increase the vulnerability of housing. For instance, precolonial architecture in Latin America was characterized by a natural regulation of the climate and environment. As new models from more developed societies progressively took over, there were changes in housing forms and construction methods that increased the

vulnerability of housing. A study conducted by Glass et al. in Guatemala after the 1976 earthquake in the village of Santa Maria Cauque [1977, pp. 638-643] established that all of the deaths and serious injuries in the village were associated with housing and in every case the collapse of an unreinforced adobe structure was involved. Either the adobe or the beams that supported it were identified as the instruments of trauma. Adobe was a relatively new construction material in the village. In 1942 all of the houses were built of cornstalk, mud-covered slats and similar materials attached to a simple wood frame. In the earthquake of 1918 there were no deaths and few injuries from these houses, even though every structure in the village was destroyed. In 1925 the adobe houses were introduced in the village modeled after the houses built by the Spaniards in Guatemala City, in spite of the fact that the Spanish city dwellers had suffered many deaths in the earthquake of 1918 from adobe brick.

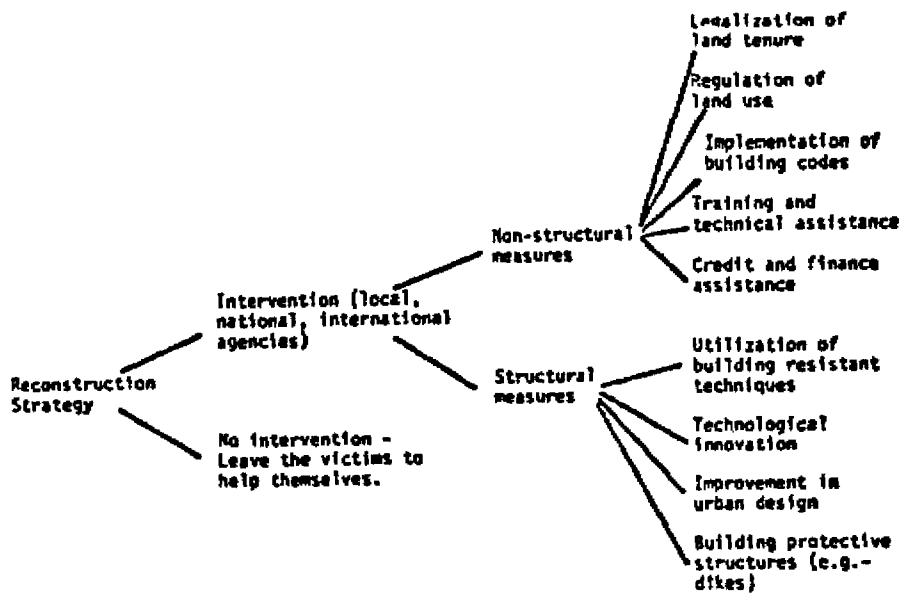


Figure 2

Options for Addressing Prevention in Reconstruction

According to Glass et al., to the Indians, the adobe houses represented the status and prestige associated with the Spanish culture.

In the reconstruction in the Dominican Republic and in Dominica, very few of the houses rebuilt during the first year and a half after the hurricanes incorporated any wind resistant techniques, in spite of the

fact that both countries are prone to high winds and that between 1973-1974 Dominica experienced twenty-six tropical storms.

The ability of society to adopt a preventive vis-a-vis a palliative approach after a disaster depends upon the organization of the society, the orientation of the government, and the availability of resources. It is obvious that a reduction in vulnerability comes not only from specific measures to reduce risk for the population but also from an overall improvement in the quality of life of the involved population.

5. In most cases, housing reconstruction in Latin America and the Caribbean focuses primarily on the provision of shelter and ignores other elements that are essential to the housing process.

As defined by Linn [1979, p. 208], the most important attributes of housing are the following: (1) access to employment opportunities, to services such as health and education facilities, and to community contacts; (2) space as reflected by the size of the lot; (3) security of land tenure; (4) on-site services such as water, energy supply, waste disposal, drainage, and security from crime and fires; and (5) shelter structure to provide protection from the elements, privacy, and domestic living spaces. The majority of post-disaster housing programs in Latin America and the Caribbean reflect concern with only one aspect of these five attributes: shelter structure. Most of the programs in the past have been concerned with the provision of the material structure of the houses and ignored the other four attributes. The importance of those attributes is based on the issues that are described next.

Location. The differential advantage of various locations derive essentially from their differential access to employment opportunities. According to Grimes [1976, p. 40] the location of a dwelling is as much a part of its essence as its plaster and bricks. A dwelling located far from employment opportunities and social services is more expensive than one with better access, because travel expenses must be included in the cost of living at that location. Space as reflected by the size of the lot is not only important for the possibility of progressive development and evolution of the house, but it can also affect the safety of the house. Plots too small to permit an adequate separation between buildings can increase the risk in earthquake-prone areas and the vulnerability to fires. Security of tenure is an essential component in the housing equation. According to Dunkerley [1978, p. 7], tenure arrangements are of prime importance in projects directed to stimulating dwelling construction or improvement, since they affect security of occupancy and hence the willingness of occupants to invest their efforts and savings in buildings on their own plots. The provision of land tenure can be an important incentive to the rapid reconstruction and consolidation of housing. In Dunkerley's words, "the investment by plot holders in the building or improvement of their dwelling is largely conditional on their perception of the risk that their tenure will be contested on their investment and lost by forced removal by a private landlord or public action, without satisfactory compensation" [1978, p. 24]. On-site services are another essential component of housing. Adequate sanitation, electricity, waste disposal, and drainage are not only important to the health of the population, but to the success of the reconstruction process. Lack of services creates added costs to low-

income populations. A study conducted by Thomas in Peru measured spatial differences in poverty and estimated that the price of water sold by water vendors in those areas that are not serviced by piped water is as much as twenty-five times that of water from metered connections. Alternative sources of light (e.g. candles), are estimated to be over twice as expensive as electricity [1978, p. 78]. If services are not considered from the outset, upgrading may be a very slow or non-existent process. After the 1972 earthquake in Nicaragua, \$3 million were spent in building Las Americas, temporary settlement of 11,000 housing units that immediately became permanent. Although an additional \$15 million were provided in concessionary loan funds to improve and expand the basic housing structures and to add individual water and sewage connections, improvements to the existing homes proceeded very slowly. The drainage system was ill-maintained, garbage collection was poor, malaria was a problem, and fire protection was barely adequate four years after the settlement was built [Comptroller General of the United States, 1977, p. 47].

The emphasis of reconstruction programs on the shelter structure without an adequate consideration of the other four major components of housing is a widespread tendency in Latin America and the Caribbean. Post-disaster reconstruction is an instance when the physical and social characteristics of housing for vast sectors of the population are determined. Given the increased housing needs posed by disasters and the massive investment they require, an understanding on the part of housing-related agencies of the importance of access, land tenure, size of lots, and provision of services is crucial.

6. Under the traditional economic mechanisms, the equilibrium between supply and demand may bring about a rise in the price of housing-related items.

Unless a strict control of prices is established by the government of the affected country, the context of scarce resources will create a rise in the prices of basic construction materials, land, and labor. Considerable inflationary pressures were felt after Hurricane Fifi in Honduras in 1974, after the earthquake in Nicaragua in 1972, in Guatemala in 1976, and after the hurricanes in the Dominican Republic and in Dominica in 1979. This phenomenon is the result of a rapid increase in the prices of imported goods (i.e. roofing materials), shortages of labor, and inelasticity in the supply of certain local products affected by the disaster [United Nations, 1979, p. 16]. For instance, in the case of Guatemala, at the end of 1976, the Reconstruction Committee estimated that the effect of inflation following the earthquake would raise the costs of construction from \$1,021 million to \$2 billion. By that time, the price of bricks had already increased to three times the predisaster level [United Nations, 1979, p. 23]. In the Dominican Republic after Hurricane David, increases in the prices of essential building materials were substantial and the cost of low-income housing suffered a 41 percent increase in the year following the disaster [El Listin Diario, 1980]. Inflation and speculation are promoted by the lack of actions on the part of the involved government to control and regulate individual activities in the private sector. Price controls, control of speculation, and hoarding of materials should be established at all points in the housing reconstruction process. For instance, in the reconstruction of

Guatemala, the government failed to control the add-on transportation costs that were applied to lamina and cement. When distributing these commodities throughout the country, the cost of cement that was U.S. \$2.00 at the factory per bag rose to as much as five dollars a bag, less than 100 kilometers from the point where it was produced [Cuny, 1978].

Conclusion

The type of disaster agent, the magnitude of the damage, historical and cultural factors, access to resources, the new visibility attained by existing housing shortages and deficiencies, and the characteristics of the built environment are elements that help configurate the nature of changes in housing during the reconstruction following disasters.

In disaster-prone countries, it is not hazards in general but specific disasters that generate support. However, the frequency and magnitude of disastrous events in the Caribbean and Latin America, indicates that ad hoc responses and emergency measures are not enough. Predisaster planning and prevention are critical strategies that should be emphasized. Disasters have the potential to be accelerating factors of housing changes. Preventive actions rather than palliative approaches are essential for development and frequently ignored by the short-term considerations that prevail immediately after a disaster. Government could use the emergency situation to play an important role in land acquisition, regulation of tenure, and provision of services. Special efforts should be made to minimize the adverse effects of emergency activities on housing, and to use the opportunity for developing an improved structure for human settlements.

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