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LIST OF ABBREVIATIONS AND ACRONYMS

AFE-COHDEFOR – Administración Forestal del Estado Corporación Hondureña de Desarrollo Forestal
AHECATIE – La Asociación Hondureña de Egresados del CATIE
AHDESA – Asociación Hondureña de Desarollo Ecológico y Seguridad Alimentaria
AMHON – Asociación de Municipios de Honduras
ASIDE – Asociación de Investigación para el Desarrollo Ecológico y Socioeconómico
BANADESA – The National Bank of Agricultural Development
CAMI – Iniciativa Centroamericana de Mitigación
CARE – an international non-governmental organisation
CATIE – Centro Agronómico Tropical de Investigación y Enseñanza
CG – the Consultative Group for the Reconstruction and Transformation in Central America
COC – Centro de Operaciones y Comando
CODDEFFAGOLF – el Comité para la Defensa y Desarrollo de la Flora y Fauna del Golfo de Fonseca
CODEL – Comité de Emergencia Local
CODEM – Comité de Emergencia Municipal
CODER – Comité de Emergencia Regional
COHDEFOR – Corporación Hondureña de Desarrollo Forestal
CONE – Consejo Nacional de Emergencia
CONCERN – an international non-governmental organisation
COPECO – Comisión Permanente de Contingencias
COPEN – Permanent Committee for National Emergencies
CRED – Center for Research on the Epidemiology of Disasters
CRESER – Comites del Sector Rural
ENSO – El Niño Southern Oscillations
ERIC – Equipo de Reflexión y Comunicación
FAO – Food and Agriculture Organization of the United Nations
FDI – Foreign Direct Investment
FUNDEMUN – Fundación para el Desarrollo Municipal
GDP – Gross Domestic Product
h – hour
ha – hectare
HONDUPALMA – Palmas Aceiteras de Honduras
ICADE – Instituto para la Cooperación y el Autodesarrollo
IDB – Inter-American Development Bank
IOM – International Organisation for Migration
km – kilometres
LMDSA – Law for the Modernization and Development of the Agricultural Sector
mph – miles per hour
MPNRT – Master Plan for National Reconstruction and Transformation
NGO – Non-governmental organisation
NOAA – National Oceanic and Atmospheric Administration
NTFPs – non-timber forest products
OCHA – United Nations' Office for the Coordination of Humanitarian Affairs
ODA – Official Development Assistance
PAHO – Pan American Health Organisation
PLANFOR – National Forestry Action Plan
PROMADERAH – Proyecto de mejoramiento ambiental de desarrollo rural de Honduras
PRSP – Poverty Reduction Strategy Paper
SAG – la Secretaría de Agricultura y Ganadería
SEI – Stockholm Environment Institute
SERNA – Secretaría de Recursos Naturales y Ambiente
Sida – The Swedish International Development Cooperation Agency
SNV – Netherlands's Development Organisation
TROCAIRE – an international non-governmental organisation
UMA – Unidad Municipal Ambiental
UNDP – United Nations Development Programme
UNWFP – United Nations World Food Programme
U.S. – United States
USAID – U.S. Agency for International Development
USGS – U.S. Geological Survey

Executive Summary

Hurricane Mitch struck Honduras in October 1998 with disastrous results. Lack of access to adequate land, credit or technical assistance had forced subsistence farmers and semi-urban populations into high-risk marginal areas. Deforestation and inappropriate farming practices exacerbated their vulnerability. The losses experienced by the country ranged from lost lives, to lost livelihoods, to destroyed infrastructure.

Our goal in this study was to identify those factors in Honduran society that needed to be changed in order to reduce future vulnerability to natural hazards. During natural disasters, different groups experience distinct, widely ranging levels of harm, from minor economic damage to widespread mortality. Disasters occur through the interaction between natural events and vulnerable social and ecological systems. Most vulnerability research suggests that we should stop dealing with disasters as if the natural hazard itself is the principal cause. Instead, the underlying root causes and dynamic influences on vulnerability need to be addressed. For these reasons, we focused on the institutional (formal and informal) factors affecting vulnerability to natural hazards. In this context, we interpret institutions to be the rules that shape the behaviour of organisations and individuals in a society. This approach has allowed us to reach many insights regarding ways in which Honduras can reduce vulnerability by reforming cross-level institutional processes contributing to differential vulnerability to natural hazards.

The focus of our study was on the social vulnerability to Hurricane Mitch experienced by three rural case study areas in Honduras. Our aim was to: 1. identify key factors contributing to and affecting this social vulnerability to Mitch; and 2. capture and evaluate the importance of identified informal and formal key institutions and cross-level linkages influencing those factors. Methods included a literature review, close to 110 interviews within the local communities, focus groups, about 50 meetings and interviews at municipal and national levels as well as representatives of international organisations, and non-governmental organisations, and two workshops with a total of about 40 representatives of varying organisations involved in disaster management at different levels. We used a vulnerability framework that has been developed in previous research at the Stockholm Environment Institute and Clark University in the U.S., highlighting the socioeconomic and environmental/ecological conditions, to structure the analysis and assess the influences of the identified institutions and cross-level interactions on vulnerability to natural hazards.

MAIN FINDINGS

Our research points to several factors alleviating and increasing the vulnerability of people in the case study areas in Honduras. All of these factors are influenced by a number of formal and informal institutional as well as some other non-institutional causes active at various levels of society.

- **Improvements to formal hazard management**: in many of our interviews with various organisations, the view was that hazard management today is improved with i) COPECO (Comisión Permanente de Contingencias) being better prepared, better resourced and having a clearer role and leadership mandate, (its separation from the military since Hurricane Mitch was also widely considered to be beneficial); ii) a more developed emergency plan at the national level since Mitch; and iii) more training, organisation, awareness, and emergency

plans being implemented today, activities that are necessary for mitigation and preparation.

Several *formal institutions* are relevant for the hazard related work in Honduras, including a legal framework, emergency plans, and contracts and other agreements between Honduras and various parties in terms of preparedness and mitigation work. The Master Plan for National Reconstruction and Transformation, which was developed as a response to the devastation caused by Hurricane Mitch, also included three objectives in the area of risk management. Corruption – a consequence of an *informal institution* – came out as one of the main factors behind the problem of ineffective hazard management that was still expressed by some respondents. Cross-level interactions occurred in the cases where the improvements were driven mostly by national institutions. However, in other cases several of these improvements did not reach all the way to the local level, causing poor local awareness of hazard management responsibilities.

- **Strong social networks**: Our interviews at the local level confirmed that access to social networks increased the number of coping strategies available to people who suffered from Hurricane Mitch. Several types of networks were identified, both within the communities (family networks, *patronatos*, CRESERs, farmers' associations, and cajas rurales) and outside with external organisations. The help that social networks provided during and after Mitch consisted of additional finances (remittances, loans and donations) and other types of resources (food, water, and wood), and of help in finding shelter and alternative income sources.

Because the *formal institutions* of plans for emergency and hazard organisations were not implemented well, networks between local communities and NGOs substituted for state control during Mitch. The *informal practice* of illegally demanding money for certain services or benefits resulted in a corrupt system with aid "disappearing" and, thus, aid delivery through external social networks did not function well.

- **Migration**: Migration (and the remittances that commonly follow) creates new social networks and is actively being used in the case study areas as a coping strategy in times of natural disasters, mainly because there is no other option. Migration is not only a coping strategy for the people who migrate, but also for the people who stay behind through the remittances they receive from the migrants. But while migration may provide support in the short-term, it is not a good long-term option since people should not feel forced to move to another country to be able to cope with their situation.

The lack of *formal institutions* for the management of international migration, including a lack of appropriate legal and operative frameworks, results in unnecessarily high migration levels. In the workshops, participants pointed out that other causative factors are labour policies and salary levels in Honduras. Fee policies also influence the flow of remittances. The most influential *informal institution* influencing remittances is the norm of sending money to families back home.

- **Land management including deforestation**: Despite the relatively large proportion of farmers who invested in preventive land management strategies, Mitch still caused quite high losses of the main crop for the season. This should, however, not be interpreted as if investments in land management are useless as a preventive and adaptive measure in relation to natural hazards. Rather, it is likely that Hurricane Mitch was such an extreme event that the land management practices were only marginally useful, if that, in the case study areas. Furthermore, land management practices and livelihood strategies, in the case study areas, have changed and become more diversified since Mitch, possibly indicating a need for

improvement. Apart from the role played by land management practices at the local level, deforestation was identified as a key underlying factor for vulnerability. Much of the damage caused by Mitch was through landslides and floods, mostly brought about by deforestation.

The land tenure system – a *formal institution* – is a highly influential factor. The three case study sites had several different types of land tenure systems and a large share of the households without land. Land ownership provides access to several other coping strategies since it can be traded for other resources. Most small farmers in Honduras do not have access to credit. Access to credit is perceived as particularly important for allowing people to recover from stress, especially when external assistance is not available. It is also an important factor in allowing farmers to manage their land sustainably. Most policies in Honduras favour conventional farming and short-term land use at the expense of forest conservation. Policies focusing on income generation, through the selling of timber or the rights to exploit forested areas, also contribute to deforestation.

When considering *informal institutions* a corrupt system and traditional attitudes seemed to be highly influential. In addition, politicians, administrators, and trans-national companies had previously created a culture in which forests and trees were not valued. Finally, a number of *non-institutional causes* behind deforestation were identified, including the exporting of timber, mono-crop agricultural systems, extensive cattle ranching, lack of education and enforcement, population growth, and income poverty.

- **Overemphasis on preparedness versus mitigation**: Another factor contributing to vulnerability is the lack of focus on hazard mitigation by the relevant organisations. While there have been many improvements to the management of hazards, interviewees felt that at the national and municipal levels there is not enough emphasis on mitigation compared to preparedness. Longer term efforts to integrate natural hazard management with environmental management so as to reduce the severity of natural hazards are only slowly being implemented. The local communities, in comparison, seemed to have focused more of their efforts on preventing hazards from becoming disasters.

One *informal institution* made itself noticeable in the interviews in relation to the mitigation discussion—the culture of short-term thinking. Apart from institutions, there seemed to be *non-institutional reasons* for the lack of mitigation work, mainly a lack of resources. Today, COPECO's entire budget for all of the mitigation, preparedness and emergency work necessary in a hazard-prone country like Honduras is still only slightly more than $200,000 per year. This situation was by some interviewees blamed on a lack of political will to provide resources to hazard related work and reconstruction.

- **Poor local awareness of hazard management responsibilities and procedures**: Few people in local communities are aware of any existing emergency plans, and many are confused about which organisation was responsible for hazard management.

The primary reasons for the gap between the national initiatives and the local awareness were *non-institutional factors*. One such factor was the lack of information, or miscommunication that was noticeable within the area of hazard related interventions. Another factor could be found at the household level – the widespread illiteracy. An *informal institution* which is a more general factor influencing the communication and connection among the societal levels in Honduras, however, was a culture of mistrust.

KEY INSIGHTS

We conclude that Honduras continues to be vulnerable to natural hazards today despite a number of positive institutional changes since Hurricane Mitch. Three main areas of insights are outlined: insights on i) vulnerability as a combination between human and ecological factors; ii) institutional influences on identified vulnerability factors; and iii) cross-level interactions and vulnerability.

i) **Vulnerability as a combination between human and ecological factors**

- *Ecological and climate related factors play a role in exposure to natural hazards.* The geomorphological and topographical conditions in Honduras cause landslides and soil erosion, and the climatic conditions bring about hurricanes. Hurricanes also seem to become more severe over time.

- *Deforestation is a key contributing factor to vulnerability.* The evidence from the impacts of Hurricane Mitch strengthened the apparent link between deforestation, floods, and landslides. Being driven by humans, deforestation demonstrates the need for a change in institutions in order to reduce vulnerability.

- *Formal hazard management has improved since Hurricane Mitch,* mainly through the strengthening and restructuring of COPECO. There was still a need, however, for establishment of emergency committees at the municipal and local levels and for them to proactively contribute to the mitigation of natural disasters at all times.

- *Internal social networks, and especially migration, both reduce and increase vulnerability.* While migration may provide support in the short-term through remittances and new living conditions it is not clear that vulnerability is actually reduced in the longer term through migration (depending on the role of the people migrating, as well as their options for sustaining themselves and their families back home).

- *There are differences in priorities relating to disaster preparedness and mitigation between the national and local levels.* Longer term efforts to integrate natural hazard management with environmental management were at the time of the study only slowly beginning to be implemented at the national level. This was in contrast with efforts at the local level, where there had been more effort to prevent hazards from becoming disasters.

ii) **Institutional influences on identified vulnerability factors**

- *The institutional structure governing deforestation and land tenure influenced vulnerability negatively.* The structure that existed was ineffective, because it created inequalities, discriminated against some groups in society, and because informal institutions undermined the formal institutions. Most forestry policies favoured conventional farming and short-term land use, and enforcement of forest protection laws was commonly weak and ineffective.

- *A credit system inaccessible to small and poor farmers increases vulnerability.* There were common ideas emerging from the three sites about how the credit systems could be improved. In general, there was a strong feeling that the credit systems are subject to corruption and mismanagement, and that credit is assigned in a biased way. The credit application process should be simplified to make it more accessible to small and poor farmers.

- *Migration was not discouraged by the institutional structure.* Realising migration will

not disappear as a coping strategy, the formal institutional structure related to migration could be reviewed so as to be of greatest possible support for those people for whom migration is the only survival strategy.

• *Both formal and informal institutions were highly influential in the role taken by municipalities in hazard management.* The responsibility of the municipal planning process was to a large extent located at the national level and its interaction with the local authorities remained weak. In addition, sectors such as health, education, or natural hazard mitigation and preparedness, were commonly not included in the plans for municipal development.

iii) **Cross-level interactions and vulnerability**

• *The municipal level was weaker than the other levels*, resulting in ineffective cross-level interactions. A lack of resources reduced the municipalities' capacity to engage effectively in hazard management and environmental management. Other reasons were more internal, based on the highly political context that governs the municipalities. The CODEMs (Comité de Emergencia Municipal) were only assembled in times of hazards, with little emphasis on mitigation and long-term involvement in disaster mitigation.

• *Local communities were still poorly aware of procedures and responsibilities*. Despite improvements in the formal hazard management, less than 20% of those interviewed had any knowledge of COPECO's or CODEM's role in natural hazard interventions. Nor was there much awareness of the local level emergency organisation or local emergency plans. NGOs, civil society organisations and patronatos should be actively involved in information dissemination and communication.

• *External social networks were not as central to vulnerability alleviation as internal social networks*. Because of the lack of support from external sources experienced by many people during Hurricane Mitch, several interviewees at the local level indicated the importance of personal social networks, in relation to migration especially, in coping with the disaster.

• *The formal institutional structure at the national level was too weak to support local resilience.* The ineffective formal institutional structure in relation to deforestation, land ownership and migration weakened cross-level interactions and maintained local people's vulnerability to natural hazards.

• *Top-down and bottom-up influences are not sufficiently integrated to alleviate vulnerability.* While the responsibility for many of the failures in cross-level interactions was at the national and municipal levels, several household level factors were also responsible, such as widespread illiteracy.

Acknowledgements

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Enormous effort was made to render as accurate a picture of events and processes as possible; what errors and omissions remain are entirely those of the authors.

1 Introduction

> *'Our view is that there is little long-term value in confining attention mainly or exclusively to hazards in isolation from vulnerability and its causes. Problems will recur again and again in different and increasingly costly forms unless the underlying causes are tackled. (...) Disaster research and policy must therefore account for the connections in society that cause vulnerability, as well as for the hazards themselves.'*
>
> *Wisner et al. (2004: pp. 61)*

During natural disasters, different groups experience distinct, widely ranging levels of harm, from minor economic damage to widespread mortality. It is this revelation that drove this project. The underlying belief is that disasters occur through the interaction between natural events and vulnerable social and ecological systems. Vulnerability reduction is therefore a key investment, not only to reduce the human and material costs of natural disasters, but also to achieve sustainable development over the longer term. The case of Honduras has been chosen to illustrate this point. Here the role that high levels of vulnerability can play in creating natural disasters was perhaps most visible during one of the worst disasters in Honduran history—Hurricane Mitch—which struck the country in October 1998. Lack of access to adequate land, credit or technical assistance had forced subsistence farmers and semi-urban populations into high-risk marginal areas. Deforestation and inappropriate farming practices exacerbated their vulnerability. The losses experienced by the country ranged from lost lives, to lost livelihoods, to destroyed infrastructure (ECLAC 1999). The poverty rate in Honduras increased by an estimated 4% on average in the aftermath of Hurricane Mitch (Charvériat 2000: p. 27).

The problem of increased losses to natural hazards due to climate change leading to more frequent encounters between extreme natural events and vulnerable social systems is growing globally. Weather-related disasters continue to increase in frequency. Over the period 1993-97, an annual average of 200 disasters was registered. In 1998-2002, this number had increased to 331 (IFRC 2003: p. 179) and in 2003-2004 to 355 (IFRC 2005: p. 198). The adverse impacts of natural hazards are, furthermore, unequally distributed. Developing countries commonly experience greater losses, at least in relative terms. Ninety four per cent of all deaths from natural hazards in 2002 occurred in countries of low human development (IFRC 2003: p. 179). In terms of economic losses, many of the less developed regions have experienced relatively low losses because of their lack of infrastructure and economic assets. These low losses do not reflect a low impact on development, however—even a small economic loss can be important in countries with a very low GDP. (UNDP 2004b: p. 13) It therefore seems clear that vulnerability to these extreme events is differential.

Most vulnerability research suggests that we should stop dealing with disasters as if the natural hazard itself is the principal cause (UN/ISDR 2002; UNDP 2004a; Wisner et al. 2004). Instead, a range of underlying root causes and dynamic processes to vulnerability need to be addressed. (Blaikie et al. 1994: p. 30) Assessments of the impacts of Mitch emphasised the need for societal transformation (reduction of poverty, increased democratisation, and a less destructive use of natural resources) in order for social and ecological vulnerability to future events like Mitch to be reduced (ECLAC 1999; IFRC 1999: pp. 42; OCHA et al. 1999: p. 5; Frühling 2002: p.9). Considering the influence of socioeconomic and ecological aspects on the scale of natural disasters, an understanding of the profile and causes of differential vulnerability

becomes integral to vulnerability reduction. Factors in society at different levels influencing vulnerability therefore need to be understood. Thus, while, for example, deforestation was identified in this project as contributing to vulnerability, the extra step of asking "What is causing deforestation in Honduras and at what level of society can that influencing factor be found?" is taken.

These influencing factors can be of different character, and might include formal and informal institutions[1] at different levels (for example, national land tenure regimes and traditions), while the vulnerability is experienced at the local or household level (for example, where a land tenure policy is implemented). Hence, the hypothesis for this project was that the vulnerability of a community can be changed with a change in institutions, and that change may be necessary at a level of society different than where the actual vulnerability is noticed. Within natural sciences the importance of cross-level research has been well understood for some time. In the social science literature, however, cross-level aspects related to vulnerability to environmental change are recognised as important, but are still very little understood. (Gibson et al. 2000b)

1.1 DEFINITIONS AND OBJECTIVE

Natural hazards, such as hurricanes, floods, or landslides, are part of the events happening on earth. Natural hazards are not the same as natural disasters. A hazard becomes a disaster when it outstrips the ability of a country or a region to cope. *Vulnerability* plays a significant role in turning hazards into disasters. Vulnerability is in this project described as a function of three main dimensions: exposure, sensitivity, and resilience. For example, Honduras was, in 1998, *exposed* to Hurricane Mitch, and due to its vulnerability the losses were massive. This was due partly to the *sensitivity* of the country, shaped by both socioeconomic and environmental conditions such as the high rates of deforestation. The losses were also due to the relatively low extent to which communities had coping (short-term) and adaptation (long-term) strategies, such as local awareness of hazard management procedures, which resulted in low *resilience*. Preventing hazards from becoming disasters entails vulnerability reduction. In this project, a distinction was therefore made between those actions that are taken well ahead of a natural hazard and that are related to longer-term and more structural vulnerability-reducing initiatives (for example, land management)—here called mitigation—and shorter-term vulnerability-reducing initiatives (for example, the provision of boats and radios) – here called *preparedness*.

Institutions were, in this project, defined as the rules that shape the behaviour of organisations and individuals in a society. Institutions may be intentionally created, such as for example a country's constitution; or they may evolve over time, as cultural value systems have done. The rules, or institutions, can be both formal (for example, policies, laws, regulations, and internal procedures of organisations) and informal (for example, value systems, norms, traditions, and ethics). There can, for example, be a norm within communities to share among family members and neighbours what is left after a natural disaster. It is important to note, that with this definition of institutions, organisations are a separate concept to institutions where the former can be viewed as the actors, while the latter are the rules. (North 1990; North 1996) Institutions are active at all levels of society. Three principal levels were included in this project: the local (community and household level), the sub-regional (municipal, and

[1] In this report we use the term "institution" to refer to a wide range of informal and formal rules, norms and behaviours. It differs from the term "organisation", which refers to a physical entity such as COPECO, the Honduran hazard management authority. See Section 1.1 for more conceptual detail.

partly departmental level), and the national level. At each of these levels, there are institutions that influence the vulnerability of the rural poor. These are obviously not isolated from each other, creating cross-level linkages, influencing each other as well as the vulnerability situation among the rural communities.

Given these definitions, the general **objective** of the project is to contribute to vulnerability reduction by identifying those cross-level institutional processes that contribute to differential vulnerability to natural hazards among three rural communities in Honduras. This objective was addressed through two analytical steps:

1. Identification of key factors contributing to and affecting social vulnerability to Hurricane Mitch within three rural areas in Honduras.
2. Capturing and evaluation of the importance of identified informal and formal institutions and cross-level linkages in shaping this vulnerability through their influence on the key factors.

These steps were explored by collecting primary and secondary data about the vulnerability situation in Honduras from the local to national level. The focus was on the three case study areas introduced below.

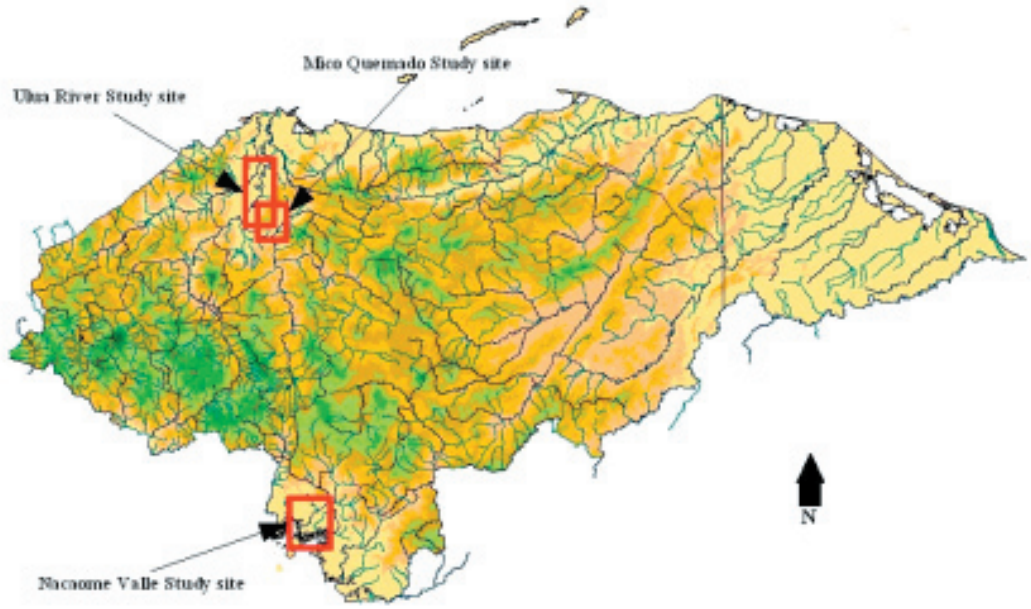
1.2 CASE STUDY AREAS

Three case study areas were selected for detailed fieldwork and analysis. The project was, to a large degree, based on the situations in the three case studies, in order to narrow down the focus at the municipal, regional, and national levels. The following section provides a brief overview of the selection criteria and case study sites.

The selection of case study areas was based on the findings from the literature analysis conducted in the beginning of the project. A set of selection criteria was drawn up and discussed with non-governmental organisations (NGOs) and international organisations in Honduras. The following characteristics were used to select case study areas:

- *Rural* in order not to broaden the analysis too much through the inclusion of urban areas with all their distinctive factors.
- *Affected by a range of natural hazards* in order to study the highly relevant, but little analysed, vulnerability situation of multiple stressors.
- *Dependent on different land-based livelihood strategies* to provide insights into the possible role land tenure and environmental management can play in vulnerability to natural hazards.
- *Different in their development levels* to allow for differential vulnerabilities to natural hazards to play a role in the analysis.
- *Containing local organisations* that could provide additional information and help in facilitating the contact with the local population.

Based on these criteria, the following three areas were selected (see Map 1.1): Mico Quemado, Ulua River, and Nacaome-Valle.



Map 1.1. Location of case study areas

Mico Quemado is a mountain above the city of El Progreso (the third most populous city in Honduras) in the north of Honduras (Map 1.2). The hillsides of Mico Quemado are part of a nature reserve. The livelihood system in this site is mainly typical hillside subsistence farming of corn, beans, and some coffee, although some crops are sold at the market in El Progreso. The main natural hazards here are landslides and hurricanes. During Hurricane Mitch, the area was mostly affected by landslides, blocked roads, and loss of crops due to excessive amounts of water and strong winds.

This hilly area has reasonably low development in terms of public services and, as a consequence, communication is poor despite its proximity to larger towns (about 5 or 6 km from El Negrito and El Progreso). Roads are of low quality and public transport non-existent. During the rainy season, access difficulties are exacerbated and sometimes the road is completely blocked. These problems are illustrated by the amount of time respondents reported it takes them to get to a telephone service and a health centre (Table 1.1).

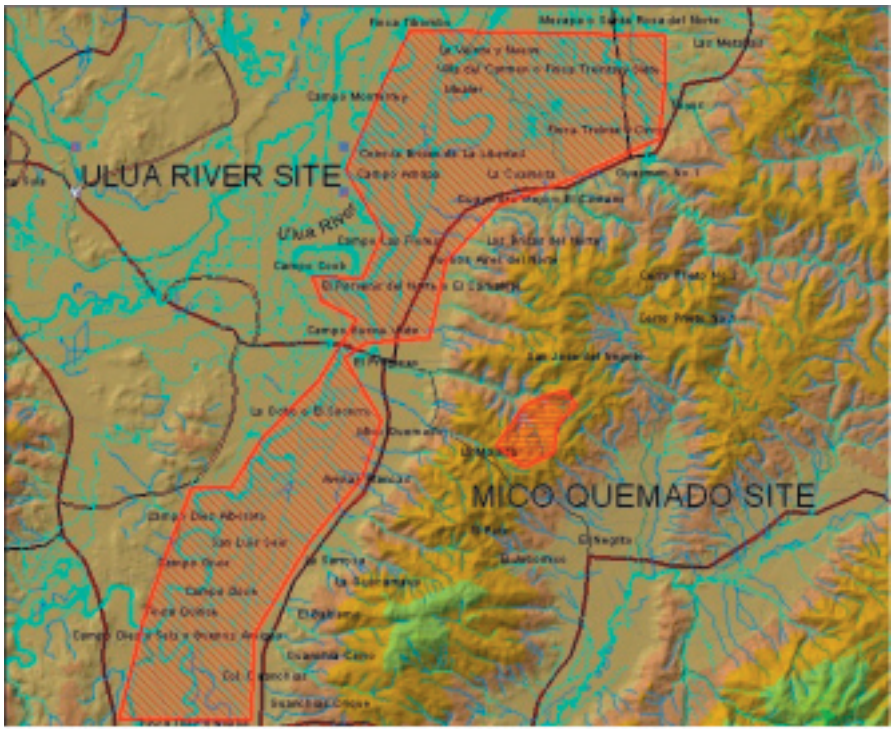
Public Service	Mico Quemado	Ulua River	Nacaome-Valle
Average time spent to access a telephone service (min)	60	30	54
Average time spent to access a health centre (min)	90	40	22
Houses with potable water* (%)	39	46	55
Daily average time spent on water collection (min)	100	63	117
Average amount of water collected daily (Lts)	100	221	115
Houses with latrine system (%)	96	78	39
Houses with electricity (%)	0	41	6

Table 1.1. Access to public services in the three sites

The predominant water source in the three sites was underground wells. In most of the houses drinking water did not receive any treatment and access was restricted to a few hours per week.

The fact that the hillsides of Mico Quemado are part of a nature reserve further restricts external investment in public services provision. The results of this are clearly shown in Table 1.1. One third of the sampled households lack access to potable water. Latrine systems exist for most households but were only installed last year and none of the houses has electricity. Everybody relies on fuelwood with consequences for health and natural resources.

The *Ulua River* area is located in the same area but on the floodplain downstream of Mico Quemado. Here cultivation is mainly of cash crops such as banana, sugar cane, and oil palm. Due to its proximity to the Ulua River, flooding is the main hazard. During Hurricane Mitch, this area suffered from floods that lasted for several weeks affecting infrastructure, crops, roads, service supply, and other economic activities.



Map 1.2. Location of case study communities in Mico Quemado and Ulua River

The development status of the Ulua River area worsened after Mitch, when the main multinational companies left. The banana plantations had previously provided public services to local people, including education. After the companies left, this responsibility was passed to the municipal administration and the quality of service provision is now far poorer than it was before Mitch. As Table 1.1 shows, less than half the households have potable water supply. Access to a telephone or a health centre is very restricted by the quality of roads, despite the fact that the area is mainly flat. Electricity serves no more than 41% of the households and about 22% of the households have no access to latrines. Still, the situation is better than in both the other case study areas.

The third site, *Nacaome-Valle*, is representative of the Pacific dry area of Honduras. Nacaome municipality is located in the southeast of the Valle department in the south of Honduras (Map 1.3).

Map 1.3. Location of case study communities in Nacaome-Valle

Nacaome-Valle has a combination of subsistence and cash crops. The crops grown in the area include basic crops such as maize, beans, maicillo, rice, tree fruits, banana, vegetables, and tuber roots such as cassava and camote. The area has been subject to recurrent droughts, but also experienced devastating effects from the unexpected floods caused by the passing of Mitch. It has better water supply services than the other two study sites (Table 1.1), but climate restricts its availability for longer periods of time. Of the three sites, families spend longer time collecting water in Nacaome-Valle. The water situation restricts agricultural activities to only one season during the year, which in turn affects the availability of jobs. Other public services such as electricity and sanitation are also very limited.

In the following section, an introduction to the natural hazard situation in Honduras and the three case study areas, and the motivation for the focus on Hurricane Mitch, is provided.

1.3 EXPOSURE TO NATURAL HAZARDS IN HONDURAS AND IN THE CASE STUDY AREAS

In Honduras, as in any other Central American country, societies have always lived with natural hazards. Honduras has been exposed to a series of disasters that range from earthquakes, fires, hurricanes and tropical storms with associated flooding and landslides, to climatic variations induced by the El Niño effect (El Niño Southern Oscillations, ENSO). Box 1.1 gives more detail.

Natural hazards in Honduras occur because of the geological conditions, which give rise to earthquakes and tsunamis; the geomorphological and topographical conditions which cause landslides and soil erosion; the geographical setting with rather long coastlines; and the climatic conditions which bring about hurricanes and droughts. With the change in climate that the world experiences, changes in extremes of weather and climate can be expected and have, to some extent, been observed (IPCC 2001). Hurricanes also seem to become more

severe (if not more frequent) in the region (Webster et al. 2005).

There is a difference between a hazard and a disaster, however – a hazard becomes a disaster when it outstrips the ability of a country or a region to cope. As Table 1.2 clearly shows, many of the natural hazards that occur in Honduras turn into disasters, affecting and even killing many people. Even though disasters caused by vulnerability to hurricanes are commonly associated with Honduras, droughts also affect many. In fact, if Hurricane Mitch is excluded from the statistics, being a very exceptional event, many more people have been affected by droughts than hurricanes.

Box 1.1. Natural hazards in Honduras

Hurricanes are defined as cyclonic winds above 120 km/h (74 mph) (Hewitt 1997: pp. 63; Tobin and Montz 1997: p. 60). The Gulf of Mexico and the Caribbean region is one of the most active in the world for hurricanes. Hurricanes are the second most common natural disaster in Honduras according to the Center for Research on the Epidemiology of Disasters (CRED) disaster data base (CRED). They represented 22% of all listed natural disasters between 1960 and 2002. About three-quarters of Honduras' land area is in the risk zone for hurricanes, with the northern coastline most directly exposed, placing some 2.9 million people at risk. (Trujillo et al. 2000: p. 15)

Landslides. During many conversations with farmers and district representatives, landslides were mentioned as a major disaster. This was especially the case in Mico Quemado, which can be explained by the steepness of area. Landslides commonly occur on steep slopes with low-resistance rocks and/or soil, and unstable structures (Trujillo et al. 2000: p. 17). They most often occur in humid areas during times of heavy precipitation. According to the literature, most landslides are initiated by weather conditions, and triggered by deforestation (Box 5.1 discusses the relationship between landslides and deforestation further). (Hewitt 1997: p. 65; Trujillo et al. 2000: p. 17)

Honduras is particularly susceptible to **floods** due to the country's exposure to cyclones which affect large areas and cause intense rainfall over relatively short periods (Trujillo et al. 2000: p. 17). Like landslides, floods can become worse with bad environmental management—the land use of a watershed, notably deforestation, agricultural practices or urbanisation, can dramatically alter the scale and frequency of floods. (Hewitt 1997p. 67) According to the CRED disaster data base, floods are the most common of all natural disasters to strike Honduras— 37% of all listed disasters between 1960 and 2002 were floods (CRED). An estimate made at the end of the 1990s by COPECO (the Permanent Committee for National Emergencies) stated that the population in Honduras affected by floods exceeds 1.4 million, mainly along the northern coastline and in the south. (Trujillo et al. 2000: p. 17)

Droughts differ from other natural hazards in four ways: (1) there is no universally accepted definition of drought; (2) drought onset and recovery are usually slow; (3) droughts can cover a much larger area and last much longer than most natural hazards; and (4) droughts are part of the natural variability of virtually all climatic regimes. (Mileti 1999: p. 179) The frequency of droughts is affected primarily by changes in the seasonal distribution of precipitation, year-to-year variability, and the occurrence of prolonged droughts. Rainfall in the Mesoamerican region is related to the Southern Oscillation with a tendency for drought conditions to occur during warm El Niño episodes off the Peruvian coast. Rainfall scenarios suggest a reduction in rainfall and an increase in drought frequency across much of the Mesoamerican region (Hulme and Sheard 1999). The most critical drought-prone part of Honduras is the west of the country. (Trujillo et al. 2000: p. 18) Droughts are fairly common in Honduras (12% of all natural disasters between 1960 and 2002 were droughts) (CRED). Since Mitch, the country has experienced two severe drought seasons. Due to these natural hazards, the malnutrition increased and people relied more on the World Food Program to satisfy their basic needs.

Type	Number of events	Total affected	Killed
Droughts	6	1,274,519	-
Hurricanes	11	2,789,051*	23,044*
Floods	18	831,472	675
Landslides	2	-	2,810
Total	37	4,895,042	26,529

Table 1.2. Natural disasters in Honduras 1960-2002

Source: CRED

* 2,100,000 were affected and 14,600 persons were killed during Mitch alone.

Hurricane Mitch was considered to be the most memorable disaster in all three case study areas (Figure 1.1-Figure 1.3). It is still fresh in people's minds, partly because of the magnitude of its impacts, partly because of the enormous attention Honduras received in its aftermath. In addition, in the Mico Quemado area, hurricanes dominated the categories of second and third most memorable disaster. The Ulua River area shows a much more diverse picture. The second and third most memorable disasters included hurricanes, the flooding that occurred after the collapse of the 'El Cajon' dam, drought, floods, and winds.

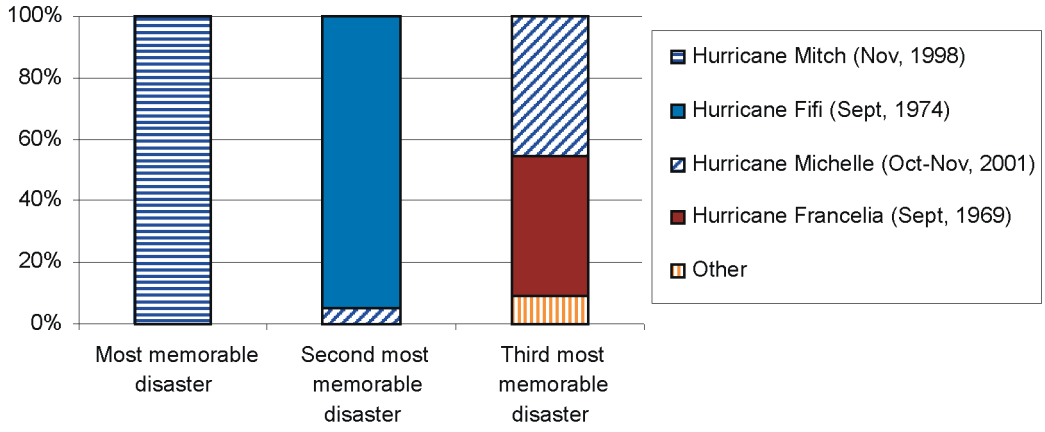


Figure 1.1. Perception of disaster history (Mico Quemado communities)

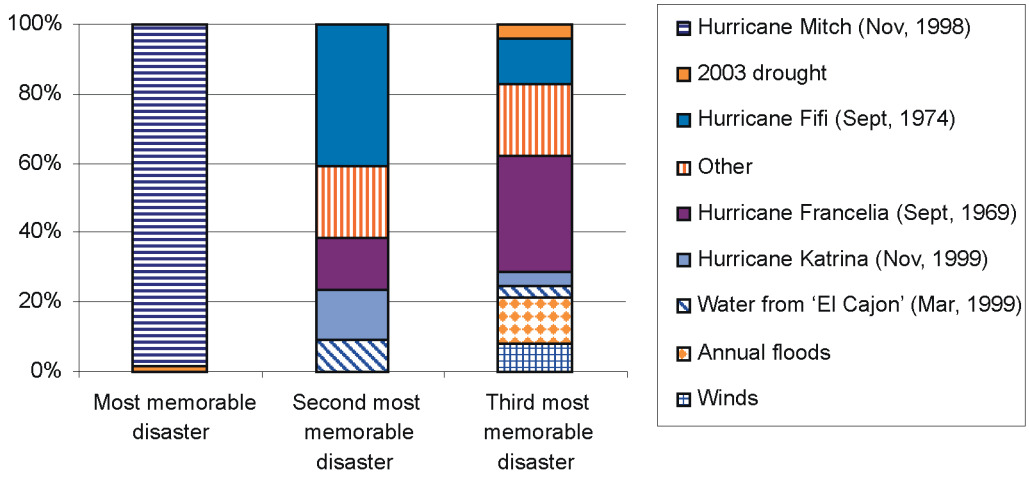


Figure 1.2. Perception of disaster history (Ulua River communities)

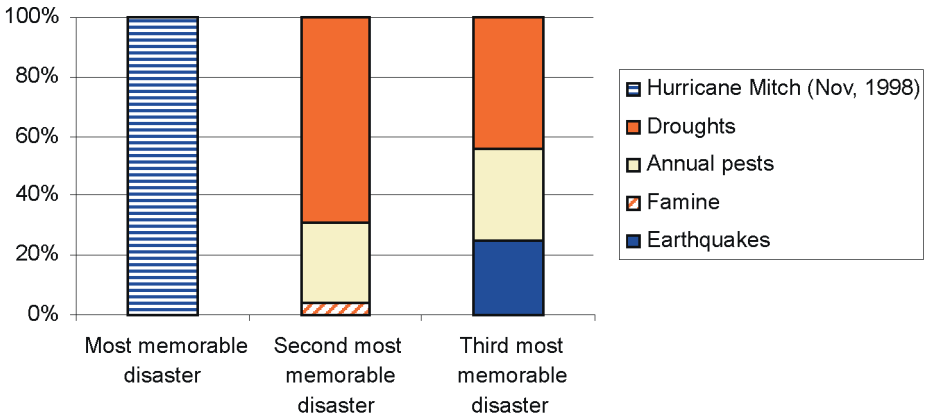


Figure 1.3. Perception of disaster history (Nacaome-Valle communities)

Finally, the Nacaome-Valle area shows a different picture than the other two areas with more focus on drought (Figure 1.3). Droughts were ranked as the second most memorable disaster by 69% of the interviewees (and as much as 73% if one includes the related problem of famine), and as the third most memorable disaster by 44%.

Even though they recognised other stresses, Hurricane Mitch stands out in a category of its own. When asked about losses it is therefore not surprising that people chose to discuss the losses caused by Mitch. This is also the reason why the project ended up focusing on Mitch, despite its original intent to analyse vulnerability to multiple stressors.

1.3.1 The impacts of Hurricane Mitch

Honduras suffered severe economic setbacks as a result of Hurricane Mitch. The economic cost of Mitch to Honduras was estimated at approximately US$3.8 billion. Most of this damage—an estimated 70%—was incurred in the productive sectors (including agriculture, livestock, forestry, fisheries, industry, and the trade sector, such as tourism). (ECLAC 1999) With regard to export crops, banana shipments were reduced by 82% compared to the previous year and the volume of coffee exports was reduced by 34%. (Meltzer 2001) The rainfall from the hurricane triggered more than 500,000 landslides throughout the country, damaged over 70% of the country's road network, and caused approximately 1,000 fatalities.

All three case study areas were severely affected by Mitch (Table 1.3). Losses reported were mainly crops, houses, belongings, and animals. The predominant focus in Mico Quemado on lost crops reflects their vulnerability to landslides due to the steep slopes on which the communities are located. The other two areas were more affected by floods, which resulted in belongings, houses, and animals as well as cultivated crops being lost. It is worth noticing that nobody mentioned the loss of a family member or neighbour. It is not clear whether this was because of the way the question was phrased, or if those interviewed were fortunate not to lose close family or friends.

	Mico Quemado (N=32)	Ulua River (N=41)	Nacaome – Valle (N=33)
Main crop for the season (1-2 Ha)	25	35	15
Houses (total loss or need to repair)	9	22	20
Road blockage	3	1	
Landslides	6		
Soil nutrients	4		
Animals	5	10	13
Belongings		20	20
Job/business	1	5	
Church			4
Everything		1	

Table 1.3. Comparison of losses from Hurricane Mitch (no. of times mentioned)

After this introduction of objective, case study areas, and the natural hazard situation in Honduras, it is now time to introduce the conceptual part of the project in more detail. At the end of the following chapter, a conceptual framework, which is later used to structure the analysis, is presented.

2 Vulnerability and natural hazards – concepts and framework

2.1 VULNERABILITY TO NATURAL HAZARDS

The differentiated losses to natural hazards show that vulnerability is essentially a combined human and ecological condition. It is when vulnerable human and ecological systems are combined with extreme natural events that losses occur. A number of different factors create and shape vulnerability and its three dimensions (exposure, sensitivity, and resilience). Most recent hazards literature places greater and greater emphasis on the social causes of disasters, although the factors related with nature are seldom completely ignored in the explanations (White et al. 2001). Many different models for the presentation of factors contributing to vulnerability can be found in the literature. Several simply divide the contributing factors into socioeconomic and environmental/ecological conditions. The categories of factors in this project further develop this simple model and build on a structure introduced by, for example, Liverman (2001) (the category "human characteristics" has been added):

- *Biophysical environmental/ecological conditions* can include, for example, the degree of slope and soil permeability, which both play a role in the risk of landslides occurring. The physical environmental/ecological conditions are especially important for the exposure dimension of vulnerability since they contribute to the probability of a natural hazard occurring;
- *Technological factors*, such as lifelines and infrastructure, are often discussed as important for short-term coping strategies. Other technological factors, for example, communication systems, are important for the preparedness of a society, and therefore influence the exposure, the sensitivity, and the resilience dimensions of vulnerability;
- *Human characteristics* that render certain groups, such as the elderly and handicapped more vulnerable to natural hazards due to their common difficulties in coping and adapting to hazardous events and trends; and
- *Socioeconomic conditions*, which perhaps is the most complex category of factors contributing to vulnerability. This category includes economic and political processes that allocate assets, income, and other resources in a society, as well as institutions. It also includes inequalities based on gender, race, or other factors.

This project addresses several of the factors above, including, for example, ecological conditions (in terms of deforestation), and socioeconomic conditions (in terms of social networks [2]). Institutions are a part of the socioeconomic conditions and are the focus of this study. The following section therefore introduces the institutional framework used in the project.

[2] See Section 3.2 for more details on social networks.

2.2 CROSS-LEVEL INSTITUTIONAL PROCESSES

Formal institutions determine the political system, the economic system, the enforcement system, and particular agreements in exchange (North 1990; Pejovich 1999; Trujillo et al. 2000). In general, those institutions that determine the political system lead to institutions determining the other systems (that is, property rights and individual contracts are specified and enforced by political decision-making), although the structure of economic interests will certainly also influence the political system (North 1990: p. 48).

Also *informal institutions* can be highly influential and affect the outcomes of formal institutions. This can be observed from the evidence that the same formal rules imposed on different societies produce different outcomes (North 1990). Informal institutions thus fundamentally influence human behaviour, while not always being directly influenced by formal institutions, such as policy (Raiser 1997: p. 2). March and Olsen (1989: p. 22) point out that "it is a commonplace observation in empirical social science that behaviour is constrained or dictated by (…) cultural dicta and social norms." Unfortunately, not all informal institutions are of a positive character. The norm that seems to exist in many countries to illegally demand money for certain services or benefits, which results in corruption, is one example of an informal institution which can lead to many negative consequences in times of natural disasters or at any time.

The inclusion of informal institutions in the analysis may be especially important in studies of developing countries. In the Western world, we commonly think of society as being formed by formal institutions, such as laws and property rights. Yet, North concludes, "formal rules, in even the most developed economy, make up a small (although very important) part of the sum of constraints that shape choices; a moment's reflection should suggest to us the pervasiveness of informal constraints." (North 1990: p. 36) Formal institutions are often more easy to reform and change, while informal institutions, often deeply embedded in the existing culture, adjust more slowly (Morrison et al. 2000). While it is important to recognise both formal and informal institutions, in practice they often overlap, making a comprehensive analysis of both categories necessary at all times (North 1981: p. 203).

The connection between formal institutions and natural hazards is recognised in much of the natural hazards and vulnerability literature that has adopted a political-economy approach to vulnerability (see, for example, March and Olsen 1989; Burton et al. 1993; Adger 2001; Kasperson and Kasperson 2001a; Wisner et al. 2004). Wisner et al. (2004) provides one example where national policies favouring export production may lead to land degradation and deforestation, increasing both the exposure to certain types of natural hazards (for example, landslides and floods), and the sensitivity of the lands that people's livelihoods depend on. This example is relevant to this project (see Chapter 3). Institutions, both formal and informal, operate at all levels, from the household to the international arena, and in all spheres, from the most private to the most public (DFID 2000). Pressures often emanate from macro-forces or institutions active at higher levels (for example, land tenure regimes, technological change, international financial institutions, and government policy), and are articulated through a finer pattern of local levels with highly variable local resource and ecological settings. At the same time, local institutions (for example, informal rules such as traditions or a mistrust of national authorities) can override formal rules and thereby affect the outcome. Hence, rules at one level of society are created and changed within a structure of rules existing at other levels. Institutions also interact with one another, both horizontally (for example, interactions between environmental management regimes, and hazard related regimes at the national level)

and vertically (for example, interactions between local systems of land tenure, and national systems regulating land use) (Young 2000: p. 4).

Institutional analyses therefore need to encompass multiple levels of analysis. A focus on a single geographic level tends to emphasise processes operating, information collected, and parties influential at that level. When cross-level linkages are not analysed and taken into account, the true cause and effect relationships may be missed and relevant processes that operate at different levels ignored. For example, an exclusive focus on the local level can lead to explanations in terms of local causes when some important influencing factors lie in processes at higher levels (increased exposure to landslides due to deforestation can be caused by badly formulated or enforced national forestry policies). (Wilbanks and Kates 1999: p. 608) The understanding of and responses to global environmental problems, as well as vulnerability to natural hazards, can be hampered by inefficiencies and unnecessary obstacles if the multi-level nature of both biogeophysical and human systems and the interactions between levels are not taken into account. (Cash and Moser 2000: p. 110) Cross-level analyses can provide key insights into the structure of causation (at what level do we find the major causes of vulnerability experienced at the local level?); build bridges for management of vulnerability; and produce knowledge that is more integrative, legitimate, and sustainable.

Hence, the crucial issue in cross-level analysis in a vulnerability context is to understand whether the variables used to explain vulnerability are located at the same level as the vulnerability situation occurs, or whether they are to be found at other levels. The linkages across levels can be of two different types (as well as a mix between the two):

- *Downward causation*: where the explanatory variables behind a certain vulnerability situation can be found at a higher level than the vulnerability situation or dependent factor(s) being explained.
- *Upward causation*: where the explanatory variables can be found at a lower level than that of the relevant vulnerability situation. (Gibson et al. 2000b: p. 222)

The analysis of differential vulnerability and cross-level institutional processes is full of nuances and complexities. The next section introduces the conceptual framework that was used in the project to help structure the analysis.

2.3 A CONCEPTUAL FRAMEWORK OF VULNERABILITY

For a framework to be supportive in the analysis of cross-level institutional processes and vulnerability to natural hazards, it would have to take the following features into account:

- The three dimensions of vulnerability – exposure, sensitivity, and resilience;
- Socioeconomic, environmental/ecological conditions, and the influence of institutions contributing to differential vulnerability;
- Cross-level linkages among those conditions and institutional processes; and
- Dynamism, to understand the changes that occur in vulnerability over time.

Figure 2.1 illustrates a framework that has been developed in previous research at the Stockholm Environment Institute (SEI) and Clark University in the U.S. (Kasperson and Kasperson 2001b; Turner II et al. 2003). All of the above features are centrally placed in the framework, and the decision was therefore made to use it to structure the primary analysis of the project, described in Chapter 3.

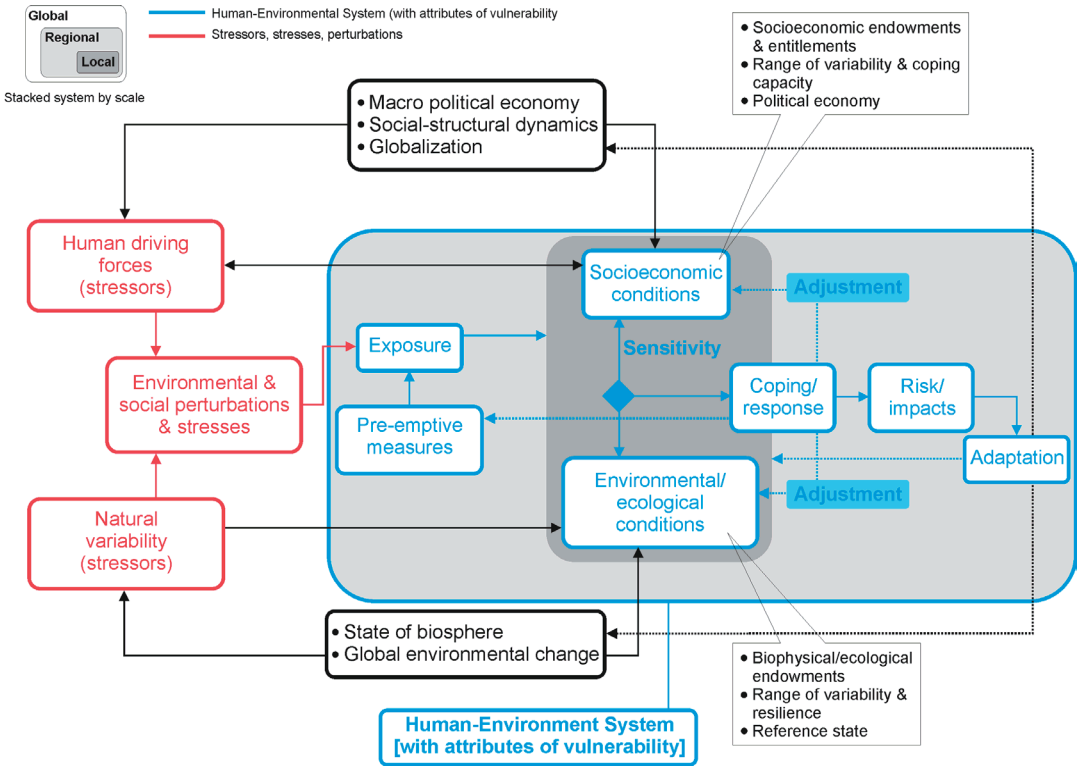


Figure 2.1. A framework for analysing vulnerability

In the framework, *exposure* consists of both environmental and social perturbations and stresses. Exposure could also be to multiple and interacting stresses. *Sensitivity* is shaped by both socioeconomic and environmental/ecological conditions, and influenced by the political economy (see top right "balloon"). Finally, *resilience* has both short-term coping/response, and long-term adaptation as important parts. Including sensitivity and resilience in the vulnerability analytical framework ensures that not only is the external aspect of exposure to hazards identified, but also the internal capabilities groups use to resist or recover from damage.

The relative contribution to vulnerability of *environmental/ecological conditions and processes* on the one hand, and *socioeconomic conditions and processes* on the other, varies from disaster to disaster. The SEI/Clark framework emphasises a broad understanding of the sources of vulnerability. Our particular focus is on how institutions as socioeconomic factors create and shape vulnerability, through influences on exposure, sensitivity, and resilience. Institutions are recognised in the framework above as important, depicted especially in the "balloons" at the top of the figure, but also in the boxes on "human driving forces" and "socioeconomic conditions". This perspective improves upon narrow sectoral understandings that previously dominated the field of risk management, such as engineering analyses that examined how to improve the structural stability of hurricane-prone housing without considering why houses were built in unsafe locations. These more narrow perspectives commonly focused on the technological factors and physical environmental conditions and less on the human characteristics and socioeconomic conditions.

The framework in Figure 2.1 also illustrates the importance of considering the interactions

among different levels of society. The framework includes the global, regional, and local levels (the different shades of grey). In this project, these levels have been changed slightly to include the national, municipal, and local levels. Finally, the dynamic feature of vulnerability is captured in the framework through the arrows creating loops from, for example, coping/ response to pre-emptive measures to exposure. The changes that occur as part of a learning process in society, hopefully resulting in reduced vulnerability as the next hazard strikes the country, can thereby be captured in the analysis.

2.4 METHODOLOGY AND METHODS

This section introduces the methodology behind the main analytical steps of the project: the analysis of i) factors shaping vulnerability to natural hazards, and ii) cross-level institutional processes influencing the vulnerability situation.

Primary and secondary data on vulnerability in Honduras in general, and the case study areas in particular, were collected and evaluated to create a fuller picture of vulnerability to natural hazards in Honduras. This was made through a literature review, close to 110 interviews within the local communities, two focus groups, about 50 meetings and interviews with representatives from government at municipal and national levels, international organisations, and non-governmental organisations (Table 2.1. For names of interviewees, dates and location of interviews, see Annex 3. List of interviewees and workshop participants), and two workshops with a total of about 40 representatives of varying organisations involved in disaster management at different levels. The interviews and analysis covering the national and municipal levels took a parallel track to the local case studies, asking about changes in community status, access to resources, vulnerable groups, and development of their capability over the years. The answers received from the interviews, focus groups and workshops were compared and checked against secondary data sources and household interviews.

International organisations:	**National governmental organisations:**
Inter-American Development Bank (IDB)	Comisión Permanente de Contingencias (COPECO)
International Organisation for Migration (IOM)	Secretaría de Recursos Naturales y Ambiente (SERNA)
National Oceanic and Atmospheric Administration (NOAA)	**Regional governmental organisations:**
Pan American Health Organisation (PAHO)	CODER #6
Red Cross	**Municipal governmental organisations:**
Save the Children	Asociación de Municipios de Honduras (AMHON)
Netherlands's Development Organisation (SNV)	Comité de Emergencia Municipal (CODEM) El Progreso
The Swedish International Development Cooperation Agency (Sida)	CODEM San Lorenzo
United Nations Development Programme (UNDP)	Nacaome municipality (Mayor and ex-Governor)
United Nations World Food Programme (UNWFP)	Unidad Municipal Ambiental (UMA) San Lorenzo
U.S. Agency for International Development (USAID)	Fundación para el Desarrollo Municipal (FUNDEMUN) San Lorenzo
World Bank	

Non-governmental organisations:	Others:
Asociación Hondureña de Desarollo Ecológico y Seguridad Alimentaria (AHDESA)	Palmas Aceiteras de Honduras (HONDUPALMA)
Bless the Children	Two independent consultants
Comité para la Defensa y Desarrollo de la Flora y Fauna del Golfo de Fonseca (CODDEFFAGOLF)	
Equipo de Reflexión y Comunicación (ERIC)	
Instituto para la Cooperación y el Autodesarrollo (ICADE)	
Proyecto de mejoramiento ambiental de desarrollo rural de Honduras (PROMADERAH)	

Table 2.1. Organisations represented in interviews at municipal and national levels

The field work was carried out in two phases:

1. November 2002: Piloting the interviews in the first case study area, Mico Quemado: 32 interviews in three communities. Meeting with the El Progreso municipality.

2. April-May 2003: Conducting the interviews in the second and third case study areas: 41 interviews in 21 communities in Ulua River, and 33 in ten communities in Nacaome-Valle. Performing the focus group meetings, workshops, and majority of the interviews with the municipal, national, and international organisations.

The selection of interviewees from the communities was controlled for gender, class and role in the community, aiming to offer a true representation of the community as well as a means to compare groups. To achieve this, direct contact with local NGO representatives, field technicians and/or social workers was established. Through them it was possible to obtain a general picture of people's conditions in the regions they were active in. They were also asked to recommend villages in which to conduct the individual interviews.

The first part of the vulnerability analysis aimed to determine those factors that mainly shape vulnerability to natural hazards of the rural poor at the local level in Honduran society. The literature on Honduras and on vulnerability to natural hazards revealed the following broader areas of socioeconomic and physical characteristics for further study: education, health, type of housing, changes in family composition, migration, infrastructure and services, natural risks and biophysical aspects, natural hazard related aspects (for example emergency committees, plans, and previous losses), land use and management, and income opportunities. The questions used in the local interviews (see Annex 1. Questions for local level interviews) were developed based on these findings, as were the questions used in the workshops and focus groups (see Annex 2. Questions for workshops and focus group meetings).

Box 2.1. Participatory data collection

The data collection methods used in this project included interviews, focus groups and workshops with representatives at the different levels. Interviews allow the collection of detailed information about how respondents frame their livelihoods, poverty situation and vulnerability. Community-wide patterns and trends can be discussed based on this data. The interviews aimed to capture cross-level and institutional aspects of vulnerability to natural hazards as identified through a literature review (see Annex 1 for the form used as support in the semi-structured interviews at the local level). The form was primarily used as a checklist by the interviewer and was not followed rigidly. This allowed the interviewer to pursue other relevant topics emerging during the discussions.

Individual interviews were complemented by focus group meetings since the latter provide a great deal of information at low cost. A focus group is a small group meeting to discuss a specific topic in an informal setting. The interviews are still necessary, however, since the results of a focus group cannot usually be used to make statements about the wider community, and because focus group members tend to agree with each other, thus obscuring differences in opinions and people's situations. Hence, formal and informal focus group meetings were carried out in each of the case study areas to develop the same set of topics in discussions among the participants to account for opposite and controversial visions (see Annex 2. Questions for workshops and focus group meetings). Focus groups were organised with the specific purpose of developing predefined questions regarding the subject of this research. On other occasions, programmed community meetings were used to present an overview of the project. During those sessions, the participants were invited to discuss the predefined focus group questions.

Finally, two workshops—one in the north of Honduras (for the first two case studies) and one in Nacaome-Valle— were held at the end of the field work sessions. The first workshop was held in El Progreso on May 2, 2003, and was attended by 22 people, representing mostly NGOs working on watershed management, environment, and rural development (for example, technical assistance) as well as a few representatives from the communities. The second workshop was held at the Red Cross office in Nacaome on May 16, 2003, and was attended by 17 people. Participants included farmers, NGO representatives (mostly from international organisations), and representatives from the municipality (see Annex 3. List of interviewees and workshop participants). A set of key questions was used to guide the workshops (Annex 2. Questions for workshops and focus group meetings). The questions were identified from preliminary data obtained from the interviews at the local level.

The exercises at the local level also partly focused on institutional issues. The institutional analysis aimed to identify the institutions influencing vulnerability in the case study areas. Questions that were explored included: Which institutions, or features of institutions, caused more exposure to natural hazards than necessary, and which impeded successful coping strategies? What policies reduced exposure or improved coping strategies? Hence, the aim was not only to discuss harmful institutions, but also institutions which help alleviate vulnerability. This analysis included institutions at all levels of society, from local up to national, hence the need for a cross-level analysis of the institutional framework. [3]

The cross-level analysis was mostly done using hierarchy theory. Hierarchy theory evolved out of general systems thinking to explain the multi-tiered structure of complex, multi-levelled systems (O'Neill 1988: p. 1). It offers one approach to explore linkages in biogeophysical and social systems and facilitates the examination of complex systems by disaggregating them into interacting processes and structures at different levels. Its central idea is that a phenomenon, such as vulnerability to natural hazards, at a chosen level of interest is the synergistic result of both the next lower level and the constraints imposed by the next higher level. (Cash and Moser 2000: p. 113)

[3] While organisations, and their internal cultures, rules, and structures are recognised as being of potential importance to vulnerability, a detailed analysis of internal organisational issues was beyond the scope of this study. The analysis in Chapter 3 therefore discusses some organisational issues, such as within the area of hazard related interventions, but does not analyse the organisations per se in any greater detail.

Hierarchy theory states that the higher levels constrain, bound and control the behaviour of the communities. At the same time vulnerability to natural hazards is a consequence of the behaviour of the lower level, that is, the vulnerability at the community level is also a consequence of behaviour at the household level. Hierarchy theory thus offers both bottom-up and top-down explanations (Gibson et al. 1998: p. 23). (Figure 2.2)

The next chapter introduces the results of the vulnerability analysis, discussing six factors which determine social vulnerability to Hurricane Mitch in the case study areas. It also analyses the institutional influences behind the factors to create a more complete picture of the vulnerability situation in the case study areas.

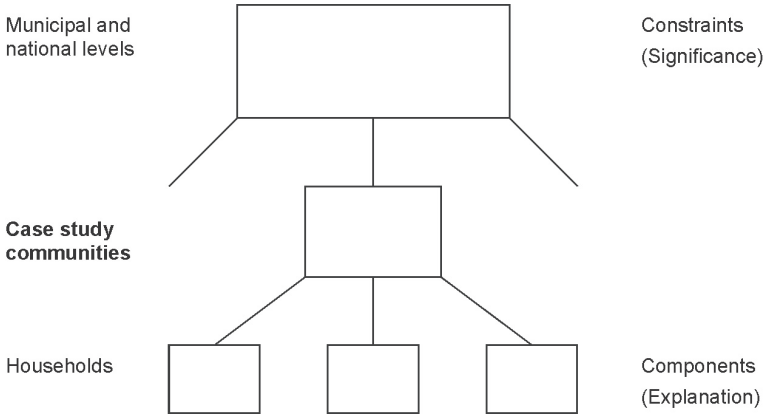


Figure 2.2. Relationships between levels in a hierarchical system

Source: O'Neill (1988: p. 2)

3 Factors contributing to hazard vulnerability and cross-level institutional processes

The research points to several factors determining the vulnerability of people in the case study areas in Honduras. All factors are influenced by a number of formal and informal institutional as well as some other non-institutional causes active at various levels of society. The following sections introduce the factors as well as the cross-level institutional analysis.

3.1 FORMAL HAZARD MANAGEMENT

Despite some challenges outlined in the sections below, the interviews with international organisations, COPECO (the Permanent Committee for National Emergencies) themselves, and some NGOs, expressed that the formal[4] hazard management in Honduras had improved since Hurricane Mitch. In Honduras, hazard related work is primarily the responsibility of COPECO. COPECO was created in 1990 to replace COPEN (the Permanent Committee for National Emergencies) (COPECO 2002). The basic idea was to have an organisation that was present at all levels of society—from the national down to the local—and responsible for the work surrounding natural hazards such as landslides, hurricanes, floods, earthquakes, and volcanic eruptions (COPECO-a)[5]. While COPECO is active at the national level, the CODERs (Regional Disaster Committees composed of 11 brigades) operate as regional civil defence units, coordinating the involved parties at a regional level. This system is further divided into municipal civil defence units (CODEMs) with the responsibility for planning and analysis; and local civil defence units (CODELs) focusing on the operational and preventive work in the local communities (see Figure 3.1 for an illustration of a part of COPECO's structure). (OCHA 1998) COPECO is thus structured as a cross-level organisation.

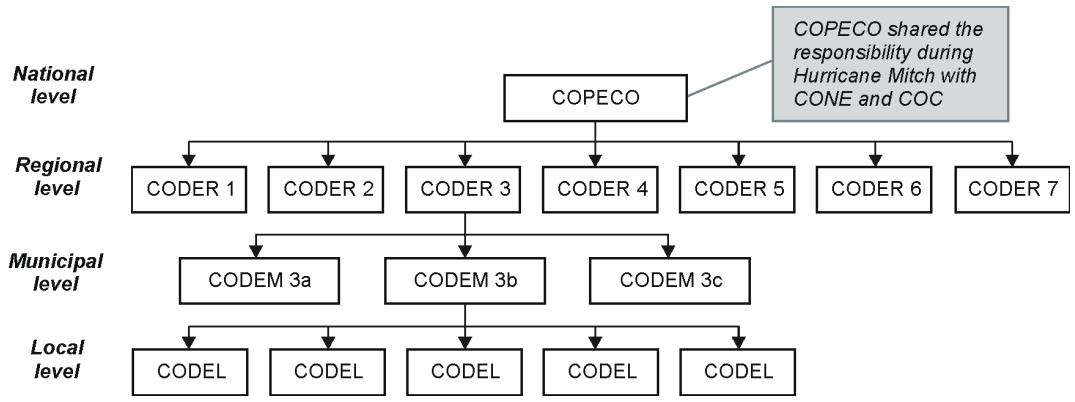


Figure 3.1. The structure of COPECO (with example from CODER 3)

4 This section discusses the formal part of hazard management, as opposed to the more "informal" management of a hazard that, for example, social networks contribute to.

5 Droughts are dealt with by the Ministry of Agriculture and Livestock (SAG – la Secretaría de Agricultura y Ganadería).

A couple of other organisations were active in hazard related work during Mitch. COPECO answered to the National Emergency Committee (CONE), which was coordinated by the President of the Republic. CONE was, by decree, created during Hurricane Mitch to function as an information centre due to COPECO's inability to gather or distribute the information necessary to manage a major national disaster (CONE was not involved in actual response operations, which was more the responsibility of COPECO). It was a new umbrella organisation which presided over the government's various ministries involved in the response. According to some reports, information during Mitch was fed from the CODELs and CODEMs through CODERs to COPECO and CONE (COPECO-a). No military appointees were named to the CONE management structure. This, along with the weak position of COPECO, left the military to work essentially on its own, although in close collaboration with international teams. To organise their work, an independent centre—COC (Command and Operations Center)—was set up. COC was entirely military and included foreign military representatives from all but one contributing country—the United States. Ultimately, responding to Mitch was overwhelmingly a question of logistics, and the military was therefore greatly needed. (Olson et al. 2001) Both the CONE and the COC were dismantled after Mitch and COPECO went through a major reform of their structure (Olson et al. 2001). The COPECO does not work alone today either, however. Hazard intervention work is to a large extent built on a network of collaborating organisations, all with their respective responsibility and roles (see Annex 4. COPECO network).

The above introduction to the hazard management organisation during Hurricane Mitch shows how many organisations that were involved in the hazard work at that time. The first improvement in hazard management mentioned by interviewees therefore related to the general organisation: COPECO is better prepared, better resourced and has a clearer role and leadership mandate today (many organisations took the initiative during Mitch; everybody filled the vacuum left by government, which led to chaos). This is also confirmed in an evaluation made by the ProVention Consortium of recovery efforts following major natural disasters, which states that "the Honduran emergencies committee system has been strengthened." (Telford et al. 2004: p. 16) The evaluation particularly mentions the system of interrelated organisations across societal levels, and the improved integration of communities with disaster and risk management organisations (Telford et al. 2004). Also the separation from the military is especially mentioned. The National Reconstruction Report (Government of Honduras 2004: p. 27) states that new personnel have been contracted, the financial-administrative system and certification in fund management have been improved, and the regional offices have been strengthened. In addition, a radio communication network was installed at national and regional level (Government of Honduras 2004: p. 27).

However, several non-governmental representatives at the national level claimed that COPECO is not any better prepared today than before Mitch. They also claimed that COPECO shows little leadership, while its focus is still too reactive. An integrated approach, where natural disaster work is treated as a part of overall development work, is still not apparent (see Section 3.5). Also the interviews at the municipal level pointed to a lack of collaboration and communication between those organisations supposedly involved in the natural hazard work. This was perhaps a bigger problem in the north. In Nacaome-Valle, the regional sub-commissioner of COPECO expressed great appreciation of the NGOs involved, whom they primarily depended on for training people, an area that the municipalities can not afford to organise themselves. These criticisms could very well be true when it comes to mitigation work, but otherwise the impression was that the national part of COPECO certainly had become

significantly better organised, with a clear leadership role within hazard related interventions. Whether this leadership stands fast in times of disasters is, of course, difficult to ascertain until another disaster strikes the country.

The second improvement in hazard management, mentioned by interviewees, related to the planning. Guidelines existed prior to Mitch (ECLAC 1999). COPECO did manage to organise the evacuation of the north coast in the early days of Mitch and probably saved many lives in that region (OCHA 1998). However, COPECO has, since Mitch, a more developed emergency plan at the national level. Hence, emergency plans are not a new phenomenon in Honduras although they have been further developed and refined over the past years.

Finally, the representatives of the headquarters emphasised the importance of communicating these plans to the communities. They implement more training, organisation, awareness, and emergency plans at the time of the field work; activities that are necessary for mitigation and preparation. Their collaboration with NGOs to build the public's capacity had also been strengthened after having realised that people have a lot of experience with natural hazards, but no education. As quoted in *Honduras This Week*, the national fire department criticised the government for not having trained people for evacuations before Hurricane Mitch (Kohl 2000). Due to a lack of capacity in the government to get to places and clear roads so that traffic could flow again, Honduras was run by CODERs, CODEMs, and local municipalities for a period after Mitch. (OCHA 1998; Kohl 2000) At the time of the field work, the capacity building is for all ages of the population—there is work with primary and secondary schools to make children aware, a new Masters programme in risk has been introduced at the national university, and adults are also trained. Box 3.1 describes additional preparedness activities at the national level.

Box 3.1. Mapping and risk management

Several practical activities focusing on mitigation and preparedness have begun since Hurricane Mitch. One initiative is the production of reliable flood-hazard maps of Honduras. These were especially important to rapidly determine flood hazards in those municipalities that were hardest hit by floods, and where rebuilding was already underway. Since then, the US Agency for International Development (USAID) and the USGS have developed maps of the areas and depths of the 50-year-flood inundation in 15 municipalities* in Honduras as a tool for agencies involved in reconstruction and planning. The risk mapping that has been performed is not enforced by the municipalities, however.

The IOM has a project on risk management in communities that are highly vulnerable to natural hazards. The project focuses to a large extent on capacity building of members of the CODELs in four municipalities (none of which coincide with the municipality chosen for the local case studies in this project). The aims are to integrate the CODELs in the CODEMs and in COPECO as well as in the early alert systems that exist; to provide basic risk management tools (for example, contingency plans, risk maps, and early alert systems); and to implement small projects within certain communities. Another activity is a course, provided by CATIE and AHECATIE (La Asociación Hondureña de Egresados del CATIE), on how to implement a system for local management for vulnerability reduction, gathering national experiences of natural resource management, and community participation.

* Catacamas, Choloma, Choluteca, Comayagua, El Progreso, Juticalpa, La Ceiba, La Lima, Nacaome, Olanchito, Santa Rosa de Aguán, Siguatepeque, Sonaguera, Tegucigalpa, and Tocoa.

Sources: Kresch et al. (2002); Mastin (2002); OIM (2003); CATIE and AHECATIE

3.1.1 Formal and informal institutions influencing formal hazard management

There are several formal institutions that are relevant for the hazard related work in Honduras, including a **legal framework** guiding the organisational structure as well as the focus of COPECO's work, **emergency plans** which aim to guide the interventions in times of disasters, and **contracts and other agreements** between Honduras and various parties in terms of preparedness and mitigation work. The Master Plan for National Reconstruction and Transformation (MPNRT, see Box 3.2), which was developed as a response to the devastation caused by Hurricane Mitch, also included three objectives for the area of risk management (Government of Honduras 2004: p. 26-27):

1. to "establish an organized, permanent, effective and efficient system for disaster prevention and management."
2. to "promote coordination, participation and negotiation between the diverse social actors and institutional entities for the reduction of vulnerability and increase of sustainability.", and
3. to "support cooperation initiatives that are being developed in the Central American area, as well as the reparation and approval of a Framework Law that allows the establishment of regional systems of prevention, mitigation and disaster assistance management".

Box 3.2. Honduras' Master Plan for National Reconstruction and Transformation

After Mitch, the Consultative Group for the Reconstruction and Transformation of Central America (CG) was formed and includes representatives from countries such as Canada, Germany, Spain, Sweden and the United States, and the governments of Central America who have committed to sharing the responsibilities for reconstruction and transformation in the region. Within the parameters set by the CG, each country developed its own national plan for reconstruction and transformation in the post-Mitch period. In Honduras this plan was called the Master Plan for National Reconstruction and Transformation (MPNRT). The MPNRT was considered an important step towards the sustainable development of natural resources and the strengthening of democratic participation. It was intended to fight poverty and promote comprehensive human development through actions that reduce extreme poverty and improve the quality and coverage of basic social services. It also aimed to reduce vulnerability through the sustainable management of natural resources and the environment, and an appropriate system for the prevention and mitigation of disasters, as well as the promotion of democratic participation and social equality in the various aspects of national life. With its implementation, Honduras hoped, by 2001, to recuperate the majority of the losses caused by Mitch, that the GDP would be higher than 1998 levels, and that social indicators would show the first positive results of the reforms.

The MPNRT general objectives are to:

- Rehabilitate and revitalise the productive sector;
- Rebuild and improve the country's infrastructure;
- Rehabilitate and reform the social sector;
- Strengthen macro-economic stability;
- Institute a new type of risk management to prevent and mitigate disasters;
- Ensure the efficient and transparent management of the resources destined for reconstruction.

Key focus areas can be summarised as: economic reactivation with productive employment and rural financing; the reduction of poverty and the promotion of human development; the sustainable protection of natural resources; and the strengthening of democratic participation.

Source Government of Honduras (1999; 2004)

Several actions have taken place to comply with these objectives, including preparation of a draft proposal of the *Law of the National System of Risk Reduction and Emergency Assistance* that was used in preparing the *Law of the National System for Civil Protection;* revisions of the Construction Code; preparation of drought policies and plans; creation of the Centre of Hydro-Meteorological Forecasting; installation of hydro-meteorological-telemetric stations; and preparation of national damage and risk maps for landslides and floods. (Government of Honduras 2004: pp. 27)

There was some doubt by some respondents that COPECO had achieved the improvements reported in the above section. **Corruption** seemed to be one of the main factors behind the problem in ineffective hazard management. As a result of a practice that seems to exist in many countries to illegally demand money for certain services or benefits, corruption can be considered as an example of an informal institution. Many would agree that corruption is a big problem, and something that occurs not only at the national level, but at all levels of society. In an investigation of governance and transparency in Honduras after Hurricane Mitch (Seligson 2001), respondents were asked "Taking into account your experience, or what you have heard, the payment of bribes to public officials is; very common, common, uncommon, or not at all common?". 62.7% said it was very common or common.

Corruption is linked to several of the institutions discussed in this project, including mistrust of politicians, short-term thinking, and the importance of power structures. It may have affected the opportunities of receiving international support for continuous hazard related work. According to one of the interviewed NGO representatives in El Progreso, money was given to and wasted by the government during Mitch, which made it difficult to ask for more money from the international community for Hurricane Michelle in 2001. Corruption was also emphasised in some of the interviews at the local level, as well as with an NGO and a farmers' association at the municipal level, in relation to reconstruction. These respondents blamed poor quality levees and bridges on the diversion of aid money earmarked for reconstruction. These are clear examples of occasions where corruption has influenced the opportunities to create a well-functioning organisation dealing with hazard related work, and the effectiveness of mitigation and preparedness work.

A lot of the corruption problems at the time of Mitch were connected with the military. From that perspective, the problems of corruption linked to hazard related interventions should have been dealt with now as the military is no longer in charge of the work. To draw that conclusion would perhaps be a bit naive, however, considering how prevalent corruption was during Mitch. Instead, the issue of corruption is likely to increase the vulnerability of the rural population through less (and poor quality) investments in hazard related interventions. It can also be expected that corruption will leave poorer populations hopelessly behind in other elements of development because of their relative inability to take part in the "corruption game". Still, the issue of corruption needs to be studied further in this context (and possibly after another major natural hazard) to fully understand the role it plays in increasing people's vulnerability to natural hazards.

The improvements in hazard management that came out of both interviews and literature therefore seemed driven mostly by national institutions, indicating that cross-level interactions were occurring. However, in the sections below it is shown that several of these improvements did not reach all the way to the local level, causing poor local awareness of hazard management responsibilities.

3.2 SOCIAL NETWORKS

The second factor helping to alleviate vulnerability is the presence of social networks in local communities. The importance of social networks during disasters is recognised in the literature (see for example Pelling 2003). Such networks are not only important for coping with the impacts of extremes in weather and other catastrophic environmental events, but also for the adaptation and recovery processes (Blaikie et al. 1994: pp. 67; Adger 2003: pp. 396). The networks can be both ties within a defined socioeconomic group that may be based on family kinship and locality and ties that are external to the group. (Woolcock and Narayan 2000: p. 230; Adger 2003: p. 392) Communities with both these types of ties are better prepared to confront vulnerability, adapt to natural hazard induced situations, and take advantage of new opportunities (Adger 2003: p. 393).

Our interviews at the local level confirm that access to social networks increased the number of coping strategies available to people who suffered from Hurricane Mitch. Several types of networks **within the communities** were identified:

- Family networks. Generally there is solidarity among families during and after a disaster event. For example, in the Mico Quemado area many families lost their houses during Mitch. In those cases, relatives living nearby provided the affected families with accommodation while the disaster passed and new houses were built. The help received from migratory family members was particularly mentioned, especially in the Mico Quemado and Ulua River case studies (for more details on migration, see Section 3.3).
- *Patronatos*. The *patronato* is a community organisation comprising a president, a vice-president, a secretary, a treasurer or finance manager, and ordinary members. In Honduras as in some other Central American countries, the *patronato* of each village is the official means by which the community can obtain financial, technical, and other support from municipal, private and national authorities. The *patronato* leaders also received basic emergency training, for example from ERIC (supported by TROCAIRE). It was clear in the three case study sites that where these local organisations were active, the level of support from the authorities was higher. However, none of the *patronatos* and communities interviewed in this project were aware of existing studies and plans in the municipality for natural hazards and vulnerability.
- CRESERs (Comites del Sector Rural). The CRESERs, which are composed of members of the *patronatos*, have especially taken an active role in the Ulua River area. Their main activity is to develop self-sufficiency and to strengthen local capacities for all sorts of community development tasks. One of the main results of the CRESER activities is the creation and activation of CODELs, and they thereby contribute to reduced vulnerability through increased preparedness.
- Farmers' associations. In the Ulua River area many farmers were members of farmers' associations for sugar, banana, oil palm, and other crops. These associations are for economic purposes and are not as influential as the *patronatos* for the overall development of the communities. It was clear, though, that belonging to a farmers' association enabled the members to access credit systems that were otherwise inaccessible to most farmers. The farmers' associations thereby contributed to reduced vulnerability through an increased access to different coping and adaptation strategies (for example, through the access to credits).

- *Cajas rurales*. The *cajas rurales* are an alternative type of funding organisation providing credit to their members. They are community based and therefore focus on lower income farmers and their families. In both the Ulua River and Nacaome-Valle areas, people mentioned the *cajas rurales* as an important element of their social networks. They were created as a result of the complaints from farmer organisations about the difficulties in obtaining financial support from other sources. Their "informal" lending activities provide families with access to credits that allow for more diversified coping and adaptation strategies, thus reducing vulnerability. The number of *cajas rurales* has increased from about 2000 in 1999 to between 5000 and 6000 in 2002. (Falck 1999; 2002c)

Apart from these, quite a few **external organisations** also supplied aid during Mitch to the communities in the case study sites (Table 3.1). In general, relationships with external organisations seem to be more common in the Ulua River area. Due in part to the aid provided by the CRESERs, the *patronatos* in the Ulua River area are in a good position to negotiate projects with external organisations. The Mico Quemado site did not have much contact with external organisations even though several of the NGOs active in the Ulua River area were familiar with Mico Quemado due to the proximity of the two sites. Government support was noticeable in the Nacaome-Valle area where the municipality and COPECO were mentioned more than other organisations during the local interviews. In the Ulua River area, the organisations that were most commonly mentioned were the religious ones, such as the Menonites, the Catholic Church, or ERIC. In this area, the CRESER was also important, promoted by ERIC but substantially community based. (See Table 3.1, page 35)

As Table 3.2 (page 35) shows, aid was in the form of food, clothes and provisions in exchange for work on road restoration. The number of families receiving help differs significantly between the areas. As many as 88% of the interviewed families in the Ulua River area reported receiving aid during Mitch, compared to 59% in the Mico Quemado area and 64% in Nacaome-Valle. Table 3.3 shows whether the aid was considered to be enough. In Mico Quemado and Ulua River the importance of aid was asserted in nearly half of the cases while in Nacaome-Valle only a few people reported that the aid was enough. Despite receiving food in Nacaome-Valle, the people therefore considered the aid to be not so helpful since it was not enough. Many of the Mico Quemado interviewees did not have an opinion on whether it was useful or not and some said that the aid was not useful at all because it was not enough. (See Table 3.3, page 36)

Organisation	Mico Quemado (N=32)	Ulua River (N=41)	Nacaome-Valle (N=33)
AHDESA	6		
Municipality			2
Asonog		1	
CARE			3
Caritas		1	
CNTC		2	
Comal		1	
CONCERN	8		
COPECO		1	7
CRESER		10	
Red Cross		1	
ERIC		7	
Fosobi		1	
Fundemun			1
Fundevi		2	
Spanish Government		4	1
Italian Government		4	
Mexican Government			1
IHCAFE	1		
Catholic church		9	
Menonites		12	
Patronatos		2	
PMA	7	2	
TROCAIRE		4	
Save the Children			4
Vision Mundial			1
Total no. of organisations mentioned	4	17	8

Table 3.1. Organisations recognised by interviewees as supplying aid after Mitch

No. of times mentioned

Type of aid received	Mico Quemado (N=32)	Ulua River (N=41)	Nacaome – Valle (N=33)
Food	14	33	21
Tools, seeds, fertilizers	2	8	
Clothing	6	12	
Help to rebuild houses		13	1
Medicines		3	6
Road reparation	3		
Nothing	12		12

Table 3.2. Type of aid delivered after Mitch to people in the three study areas

No. of times mentioned

Was this aid helpful/enough?	Mico Quemado (N=32)	Ulua River (N=41)	Nacaome –Valle (N=33)
Yes	15	18	4
No	2	18	24
Just a bit (More or less)	1	2	
No opinion	14	3	5

Table 3.3. Perception of whether the aid was enough*

* NOTE: The interviewees were not asked whether aid was helpful or not for each item received. In general, aid was important as a short-term measure to fulfil most urgent needs such as food and shelter.

The case study communities seem to have better social networks within than outside the families and their own communities. This relative lack of "external" social networks is not uncommon among poorer communities. Although links that extend beyond the community are critical assets for improving welfare, the most frequently mentioned coping mechanism for poor people is the extended family (Narayan et al. 2000: pp. 55). This lack of "external" networks could also be a result of an absence of governmental mitigation, preparedness and emergency work in relation to disasters. In those cases, community ties often take over as a substitute for help from the state as a necessity, rather than a choice. (Adger 2003: p. 397)

The importance of external social networks becomes clear when looking at interviewees' answers to the question "what will they do in the eventual case of a new disaster of similar characteristics to Mitch" (Table 3.4).

Table 3.4. Actions listed by the communities to be taken if a new Mitch was to strike

Action	Mico Quemado (N=32)	Ulua River (N=41)	Nacaome-Valle (N=33)
To evacuate	4	27	26
To notify and help neighbours		13	11
To collect provisions		5	9
To create an organisation or committee	1	4	5
To organise shelter		1	4
To look for an assisting organisation	5	12	5
To swim		1	
To pray	6		1
To evacuate belongings			2
To ask to the boss for help			1
Do not know	13		
Other	3	3	

The communities who listed actions reflecting better preparedness and more capacity are the ones with more extensive external social networks. Answers such as 'do not know' or 'to pray' dominated in Mico Quemado, reflecting a reduced capacity to cope with new events and a lack of belief in external support. On the other hand, judging by the answers in Ulua River and Nacaome-Valle, such as 'to notify and help neighbours', 'create committees', 'organise shelters', or 'look for assistance' it is clear that these communities had learned the lesson of self assurance and had in this sense greater resilience.

3.2.1 Formal and informal institutions influencing social networks

Aid delivery did not function well because of COPECO's **poorly organised structure** and, according to some sources, a **corrupt system** that resulted in aid "disappearing" (Christian Aid 2000; Olson et al. 2001). **Emergency plans or organisations** were not implemented either since the country was not very well prepared for a natural disaster the size of Mitch. During Mitch, local level social networks and networks among local communities and NGOs therefore substituted for state control. However, some of the **policies and structures** relevant to external, and perhaps more formal, social networks have become better since Mitch. COPECO has a clearer role and CODEMs and CODELs are better developed today. **Institutional development for mitigation and prevention** of natural hazard vulnerability is moving in the right direction. The discussions on institutions influencing the improvements to hazard management, migration, and the overemphasis on preparedness versus mitigation contribute with more details on this.

Despite the improvements mentioned above, the discussion concluded that people still do not **trust** the government at municipal and national levels to provide the needed support during an emergency. Since networks including the government tend to rely on formal institutions (as opposed to informal collective action) (Adger 2003: p. 392), Honduras may have a future that includes high levels of both types of social networks.

3.3 MIGRATION

Migration[6] and the remittances that commonly follow create new social networks[7] and is actively being used in the case study areas as a coping strategy in times of natural disasters[8], mainly because there is no other option. However, people who have more money have more opportunities to migrate, which explains why the case study findings show more migration in the north than in the south. Hence, in the Mico Quemado case study, almost 60% of all families had migrating family members, some more than one. The corresponding number in the Ulua River area was 46% and in Nacaome-Valle 14% (Figure 3.2, page 38).

6 It is important to emphasise that while migration has been a solution to many people in Honduras, and as such has been helpful to many people in reducing their vulnerability, it is almost always the last option people turn to. People should not have to migrate just to "survive". So while migration is listed as a factor helping to alleviate vulnerability, it should be emphasised that it is not proposed that the Honduran government (or any other government) should encourage migration as a solution to vulnerability to natural hazards.

7 As a result of its importance as a coping strategy, migration is discussed separately even though it can be viewed as part of the social network discussion.

8 The discussion in this paper focuses on international migration since the majority of the interviewees referred to this type of migration as a coping strategy. Furthermore, the discussion focuses on migration as a coping and adaptation strategy in relation to natural hazards in Honduras. The situation of the migrating populations is therefore not discussed, nor are issues such as returning migrants and their socioeconomic reinsertion.

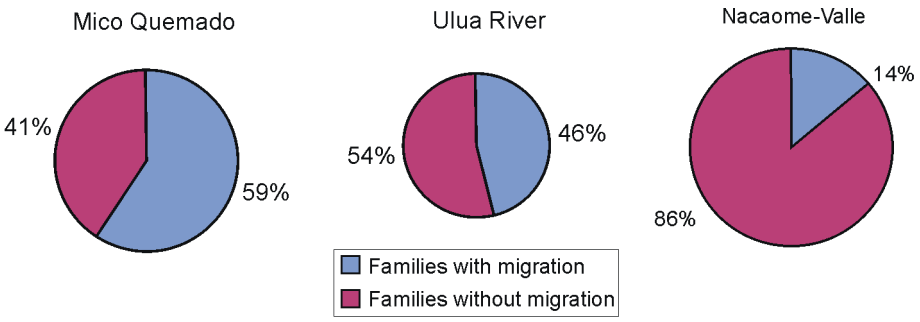


Figure 3.2. Share of families with migrating family members

That many people use migration as a coping strategy can be seen in other sources as well, where it is clear that Hurricane Mitch caused a surge in migration (Figure 3.3), or in the words of Puerta (2002: p. 1): "After Mitch, in October of 1998, Honduran migration to the US, especially illegal migration, skyrocketed.". In 1998, around 23% of a population of 5.7 million were estimated as migrants, more than half of which were women. The number of migratory people in 1999 was almost three times as many. (Valverde 2000: p. 2). The International Organisation for Migration (IOM) claimed in an interview that at least 100 000 people had moved to the US since Mitch[9].

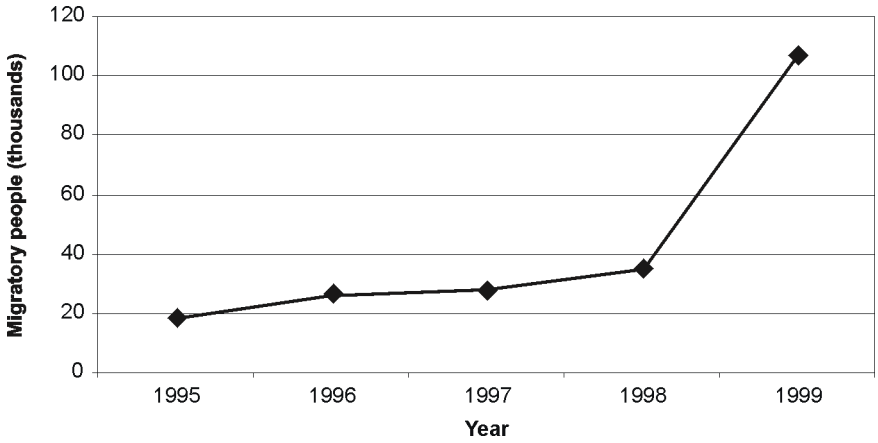


Figure 3.3. Migration figures showing impact of Mitch

Source: FAO (2001: p. 103)

The dominating destination for the migration from Mico Quemado is the US (especially for men, who were more likely to go abroad than women). People also migrate within the region and to the nearest large towns (El Progreso and El Negrito). Having the nearest town as destination was more common among women who were searching for new families after their men had left them. In addition to the people leaving the area, there are a few cases of immigrating people, mainly teenagers from other locations who lost their families' support. A similar pattern of immigrants and people migrating to the US was found in the Ulua River

[9] The data on migration should be read with care since various sources point out the difficulty in capturing all migration partly due to general problems in data gathering, partly due to the high levels of illegal migration occurring.

area. In the Nacaome-Valle site, at least in the area of interviews, migration of men was also higher than women. Locations near the border with San Salvador were said to have a higher rate of migration.

The trends identified through the local, municipal, and national interviews are confirmed by secondary sources, such as in a report by the FAO (Food and Agriculture Organization of the United Nations) where migration is said to occur both within Honduras (commonly from rural areas to urban), and internationally, commonly to the US. Puerta (2002) reports that 90% of all Hondurans living abroad live in the US) (FAO 2001: p. 50). The IOM reported in an interview that a lot of people lost their houses during Mitch and temporary houses were built in Colón, Atlantida and Cortés.

Migration is not only a coping strategy for the people who migrate (they move out of the disaster areas), but also for the people who stay behind through the remittances they receive from the migrants. Livelihood stability can be enhanced through remittances associated with migration and paid employment (Adger 1999: p. 254). In Mico Quemado, 11 people (one woman) of the 40 who migrated were reported to send money to their families in Honduras. In Ulua River eight out of 19 and in Nacaome-Valle one out of five reported sending remittances.

Remittances to Honduras have grown at a steady rate over the last decade. According to(FAO 2001: p. 50), a total of $400 million were sent as family remittances to Honduras in 1999[10]. In 2002, they had increased to $720 million according to Orozco Remittances are also one of the largest sectors in Honduras, constituting 8.5% of GDP in 2001 (Figure 3.4) (O'Neil 2003)

At the individual level, the average Honduran migrant in the US sent $257 per month back to the family in 2002 (Orozco). This can be compared to the GDP per capita – $927 in 2000 (World Bank 2002) – or to the average monthly salary in 1999 of $130 ($80 in rural areas) (Government of Honduras 2001: Annex D.13). While the exact numbers are difficult to establish, remittances are clearly important to Honduras and to those families left behind.

10 The Multilateral Investment Fund estimates the same number to be $368 million in 1999.

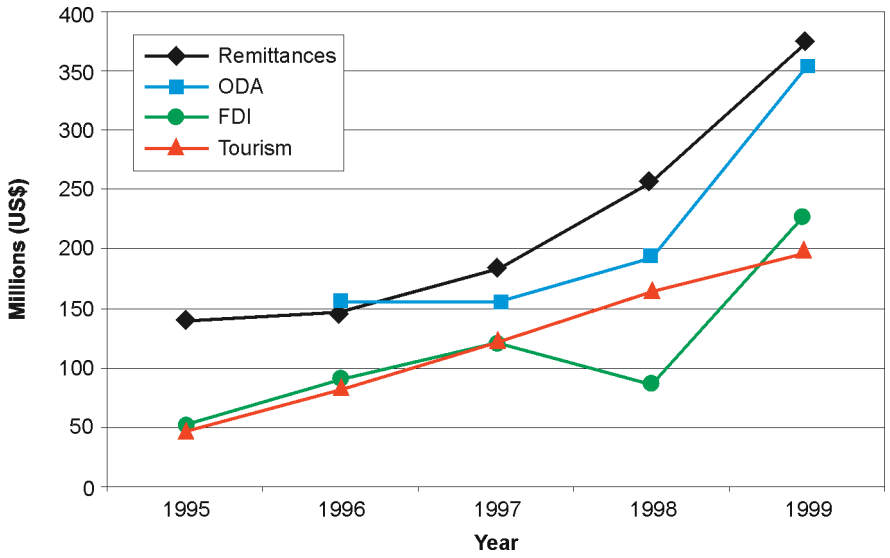
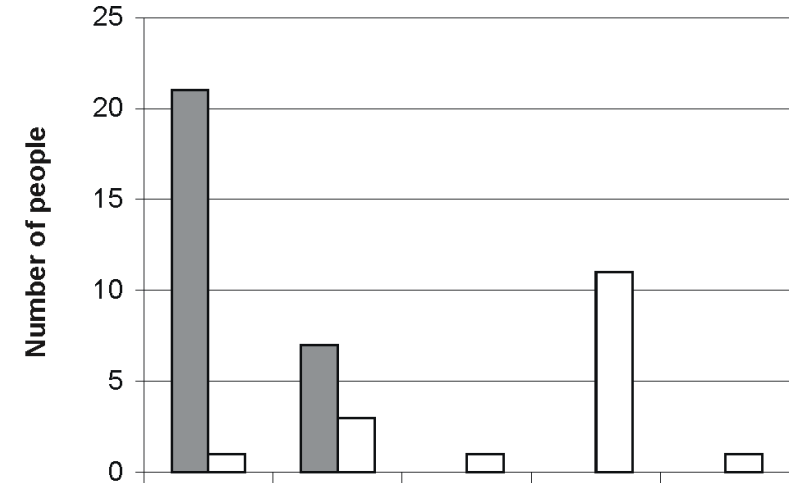


Figure 3.4. Remittances to Honduras compared with ODA, FDI, and tourism (1995-99)

Source: MIF/IADB (MIF/IADB 2001)

Despite the above discussed positive consequences on vulnerability of migration, migration can create a new situation of both reduced and increased vulnerability for a family. The impact on the vulnerability to future natural hazards of families of migrants depends, for example, partly on the role of the people who migrated. Figure 3.5 shows that in all three case study areas, most of the migrant men were either farmers or students. This pattern implies that rural people are abandoning their fields, leaving agricultural production to those having enough resources to sustain their production systems. The impact on vulnerability to natural hazards depends on what new use this land is used for. The migration of students may possibly illustrate the loss of future labour and incomes (although being students, they may have left the communities anyhow, with or without the threat of natural hazards). For the women, the roles are slightly different – 65% of migrating women were responsible for the house work, often including child care, which therefore risks having a great impact on the welfare of the children as well as on the workload of those left behind. Migrants also add numbers to the increasing population of urban areas and many women and families are left behind with the burden of surviving. This is an issue for further research, however.



	Farmer	Student	Industry	House Work	Unknown
Men	21	7	0	0	0
Women	1	3	1	11	1

Figure 3.5. Occupation of migrants from Mico Quemado, divided by gender (N=32)

3.3.1 Formal and informal institutions influencing migration

The migration situation in Honduras in times of natural hazards illustrates weak cross-level interactions which are contributing to higher vulnerability than necessary (even though migration is considered positive here, it is still clear that it would not be needed as much as a coping strategy if other parts of the formal hazard management functioned better). The main factor driving migration is the economic situation in the country; a factor further aggravated in times of disaster. Both a COPECO representative and an NGO representative claimed that, at that moment, the government was not doing much to hinder people from leaving Honduras. Rather the opposite—remittances are too important for the economy and migration is therefore being promoted by the Honduran government. That the government viewed migration as something positive was contested by the IOM. Instead, they blamed the economic situation, and said that the government was well aware of the need to change this. Increased capacity in society for exploring other options was, according to IOM, a necessary component of that work. The fact is, however, that people use migration as a coping strategy, which, at times, is expanded to an adaptive strategy as families' social networks are extended beyond national borders.

There seem to be no formal institutions aiding the management of international migration in Honduras. The weak governance of migration, including a **lack of appropriate legal and operative frameworks**, results in an inability to manage migration properly and efficiently (IDB 1999). Migration levels are therefore unnecessarily high. In the workshops, participants pointed out that other causative factors are **labour policies and salary levels** in Honduras: if more job opportunities could be created, if productive activities could be promoted internally, and if existing jobs were better paid, migration would be reduced.

Remittances are an important element in many rural families' coping strategies. The most

influential informal institution influencing remittances is the **norm of sending money** to families back home. This norm certainly seems to be used in practice by Hondurans in the US, as illustrated by the case studies in the project, although the extent to which remittances were sent differed among the three case study areas. The flow of remittances is also influenced by formal institutions such as **fee policies**. For example, migrants sending remittances from the US are charged a fee (of between $10 and $20 for a remittance of $200) (Bendixen & Associates 2001). Honduras is no exception to this, with average total charges of $15.45 for sending $200 in November 2002 (Orozco 2003). These formal institutions may undermine the importance of remittances as a coping strategy.

3.4 LAND MANAGEMENT

According to some literature, farmers using soil conservation methods and other sustainable practices survived better during Mitch than those using conventional farming methods (Marcus 1999; World Neighbors 2000). There are also some evidence pointing to the fact that land degradation increased the level of vulnerability to Mitch (Wisner 2001). The project therefore examined what **land management practices at the local level** that were implemented before Mitch. A number of land and water practices were identified throughout all three case studies as having the potential to reduce vulnerability. These include diversification of crops, irrigation (during the summer), soil conservation strategies, appropriate technical assistance, social organisation, (environmental) training, protection of dikes, building of water storage systems, agro-forestry, and reforestation. When the workshop participants in the north were asked who should take responsibility for implementing these practices, the answers ranged from the farmers themselves (as in, for example, the case of protection of dikes), to *patronatos* (for example, diversification and irrigation), to NGOs (for example, technical assistance and soil conservation), to the government at various levels (for example, irrigation and training).

It is clear that the land management strategies chosen by the interviewed households corresponded to the natural hazards most common in that area. In the Mico Quemado case study, more than 90% of the fields were located on very steep slopes (more than 30% slope). About a third of the respondents stated that they invested in land management practices as a response to the annually expected hurricanes and storms. The practices implemented were: to leave the land fallow, install live barriers, plant trees, and stop burning. In the Ulua River area, the construction of ditches was the most common land management practice, implemented to cope with the floods. Some organisations had grown nurseries in higher lands far from areas prone to floods for seeds to be available in the event of a disaster. Although they are highly prone to floods, droughts, and pests, most respondents in the Nacaome-Valle site did not list specific preventive strategies related to land management. A few of the interviewees reported that people had stopped the commonly used burning practices in order to reduce the impacts of droughts, however.

Despite the relatively large share of farmers who invested in preventive land management strategies, especially in the Mico Quemado and Ulua River areas, Mitch still caused quite high losses of the main crop for the season. The interviews conducted in the case study areas do not therefore seem to support the literature that claims that farmers who invested in land management practices were better off during Mitch. This should, however, not be interpreted as if investments in land management are useless as a preventive and adaptive measure in relation to natural hazards. Rather, it is likely that Hurricane Mitch was such an extreme event that the land management practices were only marginally useful in the case

study areas, if that. Local efforts at integrating environmental management and natural hazard vulnerability reduction are therefore likely to be more effective for more frequent events as household efforts cannot protect the land from a one-in-250 year event like Mitch. Weak planning, including feasibility studies, and implementation of protected areas are other factors causing vulnerability to natural hazards. It was also mentioned in all case studies that houses in critical areas should be relocated. Steep land or land with poor soil structure should not be cultivated at all. Instead, such highly vulnerable slopes may be better protected as forests. Farmers on high-risk hillsides would need access to better land, and/or be encouraged to grow and manage forests instead of farming.

Land management practices, and livelihood strategies, in the case study areas have changed and become more diversified since Mitch, possibly indicating a need for improvement. The experiences from Mitch as well as the more frequent natural hazards are likely to lie behind such changes. A response to the frequent floods in the Ulua River area has been to plant the oil palm, Palma Africana (*Elaeis guineensis*), which can withstand inundation. Shifting to oil palm is not a viable adaptation strategy for poorer households, and their livelihoods are therefore still as vulnerable to floods. Given the presence of permanent crops such as banana and oil palm, the use of slash and burn practices is less frequent. Coffee growing, cheese production, and chilli crops are other examples of livelihood strategies implemented since Mitch in the Ulua River area. Though not mentioned by the interviewees, it was also observed that diversification is taking place in the rural areas of Mico Quemado, where production of plantains, chilli, watermelon, yucca, beans, maize and the raising of chickens and fish were combined with the more traditional crops. Even though it is difficult to know whether these new practices and strategies would have made the population less vulnerable during Mitch, there are great expectations that they have increased the number of coping strategies and made the households more resilient during less extreme events.

Apart from the role played by land management practices at the local level, **deforestation** was identified as a key underlying factor to vulnerability primarily in our interviews with municipal officials, national ministries, international organisations, and national NGOs.[11] According to some sources, deforestation increases the severity and magnitude of hazards like flooding, accelerated erosion (Barrow 1995), and drought (Mejía 2001). The downstream consequences of deforestation include the destruction of roads, water sources and wells, and reduced productivity of farmers' fields. The relationship between deforestation and increased landslides is generally accepted in the literature, even though it is sometimes challenged (see Box 3.3). The evidence from the impacts of Hurricane Mitch, however, strengthens the apparent link between deforestation and landslides—deforested areas were decimated by landslides during Mitch due to the collapsed soil structure (see for example, CIDA (1999); World Neighbors (2000)). In general, the literature highlights deforestation as one of the main reasons why Honduras lost so much during Hurricane Mitch. Biologist and former environment minister of Honduras, Carlos Medina, claims that extensive deforestation compounded the impact of Mitch by some 30% (Rodgers 1999).

[11] Deforestation was not often mentioned in the local interviews as a cause of vulnerability to natural hazards. There could be many reasons for this: the interview questions may not have led to such discussions, or the role of deforestation in the farmers' current situation may not be clear to them, for example. Its importance was, however, confirmed in the workshops held with representatives from the communities.

Box 3.3. Does deforestation cause landslides?

The effect of trees on slope stability is dual. On the one hand the root system offers mechanical reinforcement of the soil, reduces soil moisture and lowers the water table, and the vegetation prevents drying and cracking of soil by covering the surface with litter. After clear-felling the soil is deprived of tree roots through decomposition. On the other hand tree vegetation causes increased infiltration, adds shear stress, causes root wedging and transmits wind-induced vibrations into the soil. As a consequence, reports on mass movement occurrence may contrast greatly in their attitude towards the presence of tree vegetation.

Once saturated by rainfall, even undisturbed forest can produce floods and silty water. There are cases where forest clearance seems to have led to reduced and silty streamflow. But in some cases forest removal increases streamflow and groundwater recharge because there is less evaporation. Elsewhere the trees may have intercepted cloud mist and their removal reduces streamflow and groundwater recharge, suggesting that deforested land may differ little from forested with respect to mean runoff, but that peakflows might increase after clearance because of reduction of surface litter. If leaf litter is removed from below an undamaged tree canopy it is likely that there will be rapid runoff and erosion. (Barrow 1995)

However, deforestation has been followed by severe landsliding in many parts of the world, and mass movements are commonly reported to be more frequent on deforested slopes than on forested (Westerberg 1999). Land use change has been recognized throughout the world as one of the most important factors influencing the occurrence of rainfall-triggered landslides (Glade 2003). The classic example often referred to is the study by Temple and Rapp (1972) from Tanzania, which showed that the percentage of landslides originating in cultivated land was 47%, in grassland 46% and in wooded areas less than 1%.

Many believe that there is increased peakflow and decreased lowflow after forest clearance. Floods, high stream sediment loads, and landslides are commonly blamed on deforestation and there are many cases where dams or channels have silted up after the surrounding region has suffered forest disturbance. However, blaming deforestation is often speculation.

In Mico Quemado, deforestation is increasing exposure to natural hazards such as landslides and avalanches, as well as contributing to sedimentation, fertility loss, and erosion. In the long term, and with effects in downstream areas, it is also causing water pollution, flooding, and loss of biodiversity as collateral effects. People from a farmers' cooperative in the Ulua River area implied that deforestation is the biggest problem in this area, through its role in sedimentation and flooding. Finally, a COPECO representative considered deforestation to be a problem in Nacaome-Valle, especially from a drought perspective. However, the lack of trees was also said to lead to flooding in the area when the rainy season begins.

So what has the deforestation trend looked like the last years in Honduras? Between 1990 and 1995, forested areas were reduced from 41% of the country's surface to 35% (World Neighbors 2000). The annual deforestation rate was 1% in 1990-2000, which can be compared to the average of –0.1% for other lower middle income countries (World Bank 2003). Hence, even allowing for errors, the figures are alarming and deforestation needs to be highly prioritised on the policy agenda. Figure 3.6 shows the present extent and type of land cover, with an emphasis on forest cover in Honduras—only about 20-25% of the country has closed forest, and the southern part is very fragmented.

The interviews, as well as the literature, revealed several activities at the local level by subsistence farmers that contribute to environmental degradation. Slash and burn land management was felt by local people to be the main cause of deforestation in the case study areas and was also mentioned by representatives of international organisations. Farmers argued that they continue doing this because soils in previously cleared areas are no longer fertile. It also deals with pests and diseases like weeds, snakes and insects, and is a temporary way to increase potassium levels in soils. Forty seven percent of the Mico Quemado respondents described soil fertility as poor, blaming leaching during heavy rainstorms and hurricanes.

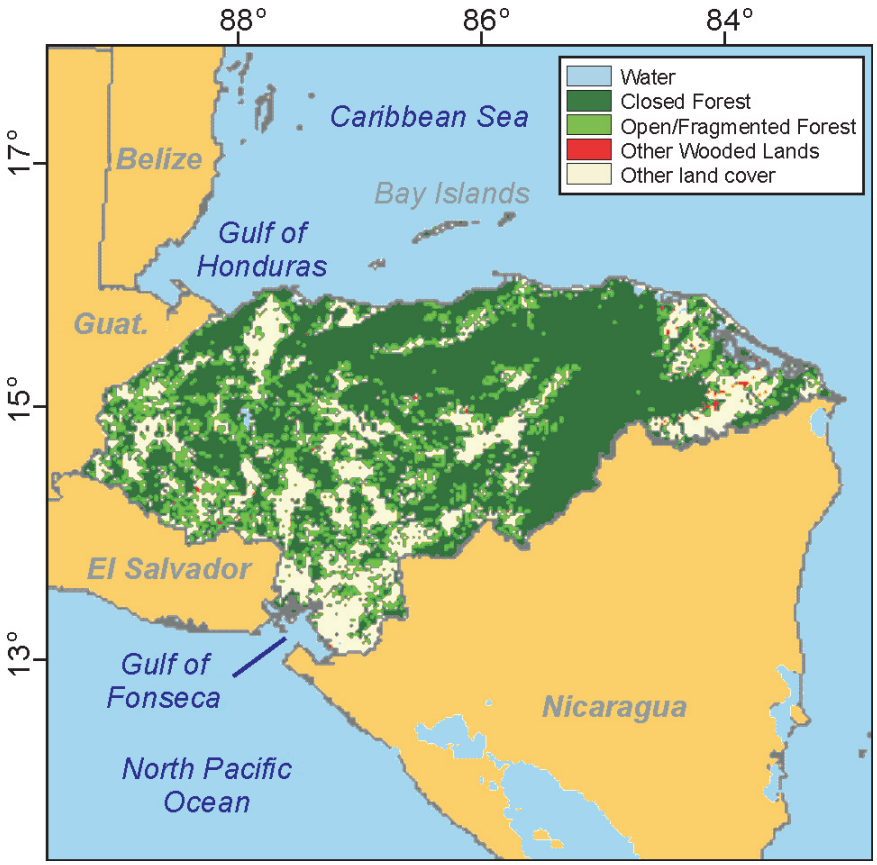


Figure 3.6. Forest cover map of Honduras

Source: Forestry Department FAO (1999)

Some farmers reported that yields of maize and beans had been reduced by nearly 50% since Mitch. In the Nacaome-Valle area there is no more forest to log; farmers burn the regrowth after three or four years of fallow. The case study in the south showed that while preparing the land, farmers use the cleared scrub for firewood which they sell informally.

3.4.1 Formal and informal institutions influencing land management

As have been seen, the high levels of environmental degradation, mainly the widespread deforestation in the country, increase people's exposure and sensitivity to natural hazards. Because of the complexity surrounding deforestation and land management, this section also covers, apart from formal and informal institutional influences, non-institutional causes of deforestation.

Formal institutions

Based on the literature, one would assume that **land tenure** would imply an increased investment in land management strategies. However, our findings in the three case study sites do not support this hypothesis (Table 3.5). In both Mico Quemado and Ulua River, more than 50% of the landowners interviewed did not carry out any specific environmental management activities. In Nacaome-Valle, none of the owners mentioned any land management practices. The explanation for this lack of investment is mainly the poor returns from smallholder farming. So while the land tenure system is a highly influencing factor, it is not the only factor in reducing vulnerability to natural hazards through improved land management. Land tenure is therefore still included here as an important influencing factor.

Action	Mico Quemado (N=32)	Ulua River (N=41)	Nacaome–Valle (N=33)
Have carried out environmental practices	8	11	0
Have not carried out environmental practices	11	12	11
Total of owners	19	23	11

Table 3.5. Land ownership and land management strategies

The agrarian reform in Honduras in the 1970s has played a significant role in shaping the land tenure situation (Box 3.4). Half of the land in Honduras is privately owned, a quarter community owned (*ejidales*[12]), and the remainder is government land (Billings and Schmidtke 2002). Eighty-two percent of the rural population (2.1 million people) live on sloping land; 80,000 farmers have plots half a hectare or smaller in size; 250,000 families own no land at all; and 90% of prime farmland belongs to 10% of the population (World Neighbors 2000).

Box 3.4. Agrarian reform in Honduras

The agrarian reform[13] has played a significant role in the current land tenure pattern in Honduras. The "golden era" of the agrarian reform in Honduras was during the 1970s, between 1973 and 1977, when 120,000 ha were distributed in only five years. Altogether 409,000 ha were distributed over three decades, benefiting a total of 60,000 (or 13%) of rural families. Although the overall process of agrarian reform had a positive impact, it almost did not resist the simultaneous process of concentrating the land in few hands. Those most affected by Mitch were farmers who lacked suitable land for agriculture and lived and cultivated in hazardous areas. Since Mitch, the agrarian reform is now at the top of the national agenda again as a strategy for re-building the country. However, the original ideology of the land reform, which stated that the land belongs to the person who works it, has been substituted by a new motto where the land is solely for the person that can buy it. If put into practice, this philosophy is expected to have appalling consequences for the poor, and especially women, who have lower access to land.

The three case study sites had several different types of land tenure systems. The following were the most common ones:

1. Farmers owning an individual piece of land and having a legal document stating their ownership (property title). This was the most common form in the case study areas. About a third of the households in Nacaome-Valle benefited from this compared to almost two-thirds in the other two areas.

2. Farmers without land who rent small plots seasonally. There are different payment schemes and other arrangements depending on individual agreements. This was the second most common form in the three sites; for example, in the Mico Quemado case study area, 41% of the farm fields were rented or worked under ejidal status.

3. Farmers occupying a piece of land either individually or collectively but without property title. The collectively occupied pieces of land are characterised by larger properties with collective land management strategies. Negotiations to establish ownership for these plots were in process, although the "ownership" was already widely recognised.

4. Farmers owning a piece of land collectively and having the property title. This is the case for cooperatives or associations formed by farmers working together. It could also

[12] Land owned by the municipality and rented to private producers (farmers, associations, etc).

[13] Promoted by the General López Arellano in his second presidential period (C.N Inversiones S.A.)

be groups who own the land collectively but use it on an individual family basis. In that case, land management is organised individually.

Finally, almost a third of the households in Nacaome-Valle and about ten percent in the Ulua River area were without land.

When it comes to formal institutions directed at the handling of deforestation and environmental management issues more directly, the response has so far been rather poor[14]. In fact, many policies are actively contributing to deforestation. Until 1974, forest exploitation was dominated by foreign-owned companies. Between 1974 and 1992 all forests were the property of the state, even on privately owned land. However, with the introduction of the Law for the Modernisation and Development of the Agricultural Sector[15] (LMDSA) in 1992, **tree tenure** was returned to the landowner and is now split between the state, municipalities, private owners and communities. The 1992 LMDSA forbids the sale of state forests to private individuals. It also asserts that state land which has been used for agriculture for at least three years can be awarded to individuals. The key issue is whether the land is considered forestry land or agriculture land. Both the State Forestry Administration (AFE-COHDEFOR) and the National Agrarian Institute have the right to decide on the status of land and whether it can be titled. The organisations are not always in agreement and add to the confused picture. Uncertainty over land tenure has encouraged land speculation as individuals cut down trees in the hope of eventually being awarded land title (Markopoulos 1999). In addition, wealthier households have claimed more land for private use than poorer households. Land privatisation has decreased the area available for use by the majority of the population, creating a situation in which ever more people depend on fewer communal resources. Hence, Sunderlin (1997) observed that land tenure, land market and institutional reforms enacted in 1992 on the whole appeared to undermine, rather than support, the aim of protecting the country's forest resources.

The greater threat to forests, however, appears to be economic development incentives that encourage deforestation (Southworth and Tucker 2001). Stonich and DeWalt (1996) state that misdirected **development strategies emphasising export-led growth** are one of the root causes of deforestation, partly due to the demand on land for export crops. She furthermore claims that governments (especially the US, in collaboration with Honduras), as well as bilateral and multilateral aid and lending organisations, are exacerbating resource destruction by focusing solely on short-term needs to generate foreign exchange and so-called development, defined only in terms of economic growth.

Another contributor to deforestation is the **financial set-up of the forestry authority** in Honduras. AFE-COHDEFOR (Administración Forestal del Estado-Corporación Hondureña de Desarrollo Forestal) was established in 1992. Its responsibilities include monitoring forest management in private and community forests, and administering private and community use of state forests. However, its primary sources of income are revenues from public auctions of standing timber in state forests and stumpage fees charged in community forests. AFE-COHDEFOR also earns revenue from extraction of non-timber forest products and service charges imposed on private forest operators. In our interviews, this policy of combining forest

[14] Due to the lack of information on deforestation from the local interviews, the following discussion draws primarily on secondary sources.

[15] Decree 31 LMDSA.

protection with financial dependence on timber extraction was perceived as highly contradictory by local people as well as some representatives of international organisations.

Another influencing factor mentioned in all three case study sites of importance to land management and vulnerability is farmers' **access to credit.** According to Adger (2003: p. 399), access to credit is perceived as particularly important in allowing people to recover from stress, especially when external assistance is not available. Kammerbauer et al. (2001) also found that limiting factors for increased production include limited access to credit and saving capacities for investment, plus the physical environment (such as slopes, soils, and water). BANADESA (Banco Nacional de Desarrollo Agrícola) was created in 1980 to supply financial resources for the development of the agricultural sector and other primary productive activities. Most small farmers in Honduras do not have access to credit. Only eight households out of all those interviewed mentioned having access to credit. Four of them were having trouble repaying their loans.

Those interviewed complained mainly about the high interest rates and complicated documentation, and the requirement that applicants own their land. According to one of the interviewed NGO representatives, interest also needs to be paid every six months whether it is synchronised with harvest or not. The length of time taken for applications to be approved is also not compatible with the farming calendar. The interest rates range from 24% to 32% per annum for crops such as melon, watermelon, maize and other activities such as cattle production and shrimps, and the minimum loan that is given is approximately US$900. Other requirements mentioned included possession of urban property, collateral (for example a house, a very well designed project, and most of the time political pressure), and coercion for farmers to make purchases from certain suppliers. The small size of farms was also mentioned as a hindering factor by those NGOs working with extension services, since few lending organisations are willing to take the risk of providing such farmers with credit. A farmers association near El Progreso partly blamed the current low productivity, which is a result of Mitch, for the lack of credit. They claimed farmers in that area to be poorer today than before Mitch since nobody is willing to give credit to farmers with low productivity. A COPECO representative commented, however, that credit is widely available, but poor education, lack of markets and high interest rates meant farmers were unwilling to take the risk of borrowing money. Considering how few of the households in the case study areas that had access to credit it is clear that there are gaps across the levels in a system that could be central to reducing the vulnerability to natural hazards.

In early 2003 the National Congress approved a law to cover the debts of many producers (amounting to more than 4,000 million Lempiras or about US$ 250 million). However, the law was enacted after many small farmers had already lost their land. In the opinion of many of the interviewees, the main beneficiaries of this law were therefore the influential big landowners. This corrodes the credibility of the credit system even more in the eyes of small farmers, making them reluctant to fulfil their conditions such as paying back loans.

It should be pointed out, however, that there are other less formal credit systems that are still available to some farmers through the **cajas rurales** (see Section 3.2). Credit is provided to groups of people that are organised into these associations, which have a legal status. When loans are allocated to such associations, interest rates are only 10%. The cajas rurales were created by law (Decreto 201-92) and since 1995 have been implemented and promoted by several official organisations in Honduras. Since 1998 the system has been managed by BANADESA.

Informed proactive policies are necessary to end the inappropriate deforestation (Kaimowitz and Angelsen 2001). In 1993 the **Forestation and Reforestation Incentives Law** was passed which intended to stimulate private forest management through, for example, cheap credits, management funds, and technical assistance. This law has, however, never become operationalised (Markopoulos 1999). Two other formal institutions with potential of doing good exist. First, the **MPNRT** mentions a number of political measures for improving the management of the forestry sector after Hurricane Mitch within the areas of conservation of forests and ecosystems, exploitation of productive forests, competitiveness of the sector, and support to distribution of benefits and decentralisation (Government of Honduras 1999: pp. 44). Second, the **Poverty Reduction Strategy Paper** (PRSP) for Honduras, one of the more important policy documents regulating the development work in the country, recognises deforestation as "the environmental problem to which the highest priority attention must be given." (Government of Honduras 2001: p. 45)[16] Apart from the PRSP, policy-makers generally only give secondary attention to the long-term environmental consequences of their policies. Indeed, most policies favour conventional farming and short-term land-use, leaving both natural resources and rural people more vulnerable to disasters (World Neighbors 2000). For example, government policies have reduced the value of forest land and forest products, and hence the potential profitability of conserving forests. Forestry laws give the government total control over all trees, both commercially and non-commercially planted, and require cutting permits which are not always granted. This makes plantation forestry risky and sometimes leads farmers to cut down their trees as soon as possible to avoid controls.

Informal institutions

Local institutions and traditions play a major role in forest management: local communities both filter and ignore central government's rules. They also have their own rules and norms which can diverge widely from legislators' and bureaucrats' expectations (Gibson et al. 2000a). Hence, several informal institutions are contributing to deforestation, mainly through their influence on the effectiveness of existing formal institutions. Sunderlin (1997), for example, states that the fundamental causes of deforestation lie in socioeconomic conditions and structures of power that are presently beyond the reach of legal remedies. It has also been said that as Honduras has overhauled laws regulating both national and private forests, it is not the law that needs changing but a **corrupt system** (a result of the informal institution, the norm, of asking and paying money to receive certain benefits) and **traditional attitudes** (Aceituno 1994). This is something that has been confirmed in several interviews in this study, where tradition was recognised as a cause of deforestation, together with inequity in land tenure. In the workshop in El Progreso it was mentioned that the "culture of deforestation" is a legacy of the banana companies. They cleared forests to build roads and plant monocrop systems. People became used to this approach and still practise it today. Previously, politicians, administrators, and transnational companies created a **culture in which forests and trees were not valued**.

In addition, our household interviews revealed that those trying to enforce and introduce forest conservation face severe danger, even death. Several cases have been reported elsewhere of those speaking out against clear-cutting risking their lives (Marcus 1999), and efforts to control illegal exploitation and deforestation have led to the murders of several COHDEFOR officials (Jansen 1998: p. 229)[17]. Yet our workshops clearly showed that people do care about deforestation and consider it and its effects a problem.

[16]The Master Plan for National Reconstruction and Transformation (MPNRT) also includes activities for tackling deforestation (Government of Honduras 2004).

Non-institutional causes

Apart from the influencing institutions, a number of non-institutional factors have led to excessive deforestation in the case study areas and throughout Honduras. Historically, **exporting timber, monocrop agricultural systems** (cotton, sugar cane, and banana in the Ulua River and Nacaome-Valle areas), and extensive cattle ranching (Nacaome-Valle region) have been the main causes. To promote these activities, road construction became widespread, further encouraging deforestation through increased access to remote areas.

Population growth was another influencing factor mentioned by people in both workshops, as well as by representatives of international organisations. Honduras' mountainous landscape means that the amount of good farmland is limited and in most cases occupied. Land scarcity pushes people out to marginal lands where they need to clear more forest. It also results in shorter fallows on existing farmed land, thus reducing soil fertility. (Humphries et al. 2000) International organisations also mentioned that rampant **income poverty** has forced peasants to seek any (short-term) method possible to earn money, which often includes slash and burn farming and timber extraction. Cutting trees for agricultural land is illegal but seems to be an easy option in the absence of suitable alternatives.

According to participants in the El Progreso workshop and NGO representatives, **lack of education** on the linkages between land management and environmental destruction among the poor was the main cause of deforestation in the north. However, as shown in this study and in others, a producer may well be aware of the environmental consequences of certain actions but still go ahead for want of a viable alternative. This is true of slash and burn farming in Mico Quemado and Nacaome-Valle. While agro-ecological intensification could reduce vulnerability to natural hazards, it may require an increase in labour or monetary investment without immediate returns. These are also common reasons why soil conservation is not practised (Jansen 1998). The income, which food grain cultivation on the slopes can generate, is therefore too low to meet the costs of soil conservation and sustainable agricultural practices (Jansen 1998).

But the lack of knowledge and capacity is not only relevant at the local level. The **lack of governmental capacity** at both national and municipal levels was also highlighted in the workshop as an influencing factor. Morello (1997) notes that there is a lack of governmental capacity to administer forest conservation areas. Under the National Forestry Action Plan for 1996-2015, municipalities are gaining a larger role in supervising forest management. In addition, according to the Law of Municipalities, municipal entities are authorised to oversee the management of natural resources on municipal lands. The lack of capacity also leads to a **lack of enforcement**—an issue that was often mentioned by national government authorities, international organisations and NGOs. This means that actions like replanting trees after harvest usually do not occur, despite being required by law. As pointed out by a representative of an international organisation, forest management today therefore looks good on paper, but is less good in practice.

Finally, **fires** were often mentioned by national agencies and international organisations as causing damage to forests. The average area damaged by fires every year (2,300 ha/year) has remained constant since 1980, despite increased mitigation efforts. Another, greater threat to forests is the **pine tree beetle** "Gorgojo" (Dendroctonus frontalis) disease, which between

[17] Sources are various Honduran newspapers 1992-1997. Janssen (1998) uses various Honduras newspapers from 1992-1997 as sources.

2000 - 2003 affected around 30,000 ha in the whole country (2002b). Corridors have been cut to stop the expansion of Gorgojo-infested areas, further contributing to deforestation.

3.5 PREPAREDNESS VERSUS MITIGATION

A second factor contributing to increased vulnerability is the lack of focus on hazard mitigation on the part of the relevant organisations. While there have been many improvements to the management of hazards (see Section 3.1), interviewees felt that at the national and municipal levels there is not enough emphasis on mitigation compared to preparedness. COPECO was, according to its National Commissioner, currently spending 70% of its resources on mitigation. However, its main activities seemed to be more about preparedness than mitigation. Such activities included improving the country's communications network (the network had around 500 radios nationwide, which still did not cover the whole country, rendering reactions dissatisfactory). They also worked to monitor hazards daily and develop early warning systems with the help of organisations like the US Geological Survey (USGS). The picture was similar in the municipalities. For example, the response on questions about the mitigation work carried out in El Progreso was to list activities that were clearly more about preparedness than mitigation (investments in levees, some boats and radios, and training of some people to drive the boat in case of a flood). They had also determined specific places where to move displaced people to receive medical help. Control of forest areas and reforestation were mentioned as necessary initiatives by everybody interviewed, but more structural mitigative initiatives were otherwise not brought up. Neither was such control part of any hazard related interventions.

Some disputed that even the preparation work was functioning well. The interviewed ex-member of the CODEM in El Progreso commented that while there was a little work done for flooding, nothing had been done to prepare for forest fires and earthquakes, for example. Even in the case of flooding, the preparation was quite weak and more reactive—the first meeting in the emergency network was only held once the first river floods. Several areas were still completely unattended by the CODEM (mostly in the mountains). Where levees existed, they were not always high enough. Or, due to corruption, they were badly built and consequently destroyed every year, according to an NGO representative. They were also often deliberately destroyed; people used them to grow corn and graze cattle, or they opened up holes in them to irrigate their plantations.

The picture did not look much better among the CODELs. In some areas, they did not exist at all; in others they had just recently started to form themselves. According to the El Progreso CODEM, there were 130 CODELs in the area, both in the mountains and in the valley. This was, however, contested by the information collected through both interviews and focus groups within this project. None of the 32 people interviewed in the Mico Quemado area was aware of a CODEL. A former member of the CODEM in El Progreso said that the CODELs only existed in the flood-prone areas surrounding El Progreso, where the CODELs had been organising themselves since last year. This was confirmed by the local interviews where six out of 41 interviewed people in the Ulua River area explicitly mentioned the CODEL when asked whether an emergency committee existed in the village[18]. The main reason for this was the El Progreso CODEM's main focus on floods, which are not the most relevant hazard type in the mountainous areas. Finally, both the CODEMs and CODELs in all three case study areas really only got together during disasters, adding weight to our impression that mitigation is not high on the agenda. The San Lorenzo CODEM did not agree that this was the case, and claimed to be active all year around, but had not, according to information received during

our mission in May 2003, had a meeting since November 2002. The San Lorenzo CODEM was only established after Mitch. At the same time, Telford et al. (2004: p. 20) claim that the capacities of municipalities vary widely and that the municipal level has been key in the recovery after Hurricane Mitch.

The local communities, in comparison, seemed to have focused more of their efforts on preventing hazards from becoming disasters. In both El Progreso and San Lorenzo there was a greater focus on mitigation. This new emphasis had been aided by people's increased awareness of the problems following a natural hazard since Mitch. The farmers in the workshop in El Progreso talked about being more conscious of having to protect the land and the hills. People in the Mico Quemado area had relocated their houses to hilltops in order to reduce the risk of losing them in landslides, and were building their houses from concrete rather than adobe. Both of these actions were informal responses performed by the villagers themselves and had not been induced by actions at more aggregate levels. In the schools, there was more education on environmental management (as a result of more interest and awareness). Out in the communities, the El Progreso CODEM collaborated with NGOs such as CATIE, AHDESA (Asociación Hondureña de Desarrollo Ecológico y la Seguridad Alimentaria), and ASIDE (Asociación de Investigación para el Desarrollo Ecológico y Socioeconómico) for capacity building. In San Lorenzo the emphasis, according to the CODEM, was on training people.

In general, people's perspectives were changing from viewing natural disasters as something "natural" to seeing them as events that have to be prevented from becoming disasters. This awareness certainly seemed sincere, yet it was noticeable that not many of the projects which were said to focus explicitly on mitigating natural hazards had adopted an integrated view of (especially) hazard management and environmental management in their project designs. This was also true for the work in the municipalities. An NGO-representative in San Lorenzo pointed out that San Lorenzo was better prepared now than before Mitch since an emergency plan existed. Yet the natural resource management issues remained the same, and thus long-term vulnerability was still not being tackled. The common view on mitigation was thus a relatively short-term view, resulting in a gap between the intentions and activities which were thought of as mitigation and actual mitigation impacts.

3.5.1 Formal and informal institutions influencing overemphasis on preparedness versus mitigation

One informal institution made itself noticeable in the interviews in relation to the mitigation discussion—the **culture of short-term thinking**. Several people—both NGO representatives and international organisations—discussed the effect of this culture on how natural hazard related work is viewed within the overall development picture. According to them, there was no holistic approach; natural hazard work was treated as a separate agenda. Someone who had been closely involved with hazard related work in El Progreso was of the opinion that Honduras did not take safety seriously ("when it comes, we'll deal with it") and considered this the main reason for the lack of mitigation. During Mitch, this led to a fragmentation of emergency interventions which in turn hindered communication among the hazard related organisations and between them and the local communities. COPECO's marginalisation at the time was part of this problem. Furthermore, plans in Latin American countries are commonly only alive

[18] As many as 25 out of 41 answered 'yes' to this question although most people did not specify what type of committee existed.

during the term of the sitting government. As soon as the government changes (which it quite often does every four years) people throughout the hierarchy, both those politically elected as well as many civil servants, change too. In addition, not only political documents but also apolitical documents like emergency plans change. This has imprinted a short-term view of actions and consequences in people's minds.

Apart from institutions, there seemed to be other reasons for the lack of mitigation work. Several people, both NGO and government representatives, mentioned the **lack of resources** as a problem for management of natural hazards. The money available for mitigative work was too little. Since its conception, COPECO has been operating under severe resource constraints, both financially and technically (equipment as well as personnel). The United Nations Office for the Coordination of Humanitarian Affairs (OCHA), in an analysis of the governmental response to Mitch (OCHA 1998), reported an annual budget for COPECO of $200,000 before Hurricane Mitch[19]. Its office only had four phone lines and no e-mail capability, which made it difficult for COPECO to gather or distribute the information necessary to manage a major national disaster. COPECO also lacked the human resources, administrative and management capacity, and necessary logistics to be able to fulfil its legal mandate (Government of Honduras 1999). Today, COPECO's entire budget for an emergency is still only slightly more than $200,000 according to the COPECO headquarters. This is far too small to cover all of the mitigation, preparedness and emergency work necessary in a hazard-prone country like Honduras. This situation was blamed, by some of the interviewed NGOs, on a lack of political will to provide resources to hazard related work and reconstruction.

[19] According to an ex-president of COPECO, the total budget of COPECO at the time of Hurricane Mitch was about $113,500.

3.6 LOCAL AWARENESS OF HAZARD MANAGEMENT RESPONSIBILITIES AND PROCEDURES

Despite the improvements since Mitch, COPECO was unfortunately poorly understood by people, especially at the local level. Without a clear organisational structure, to which everybody involved can adhere, there is a great risk of confusion and inefficiencies during those important hours and days when a disaster strikes.

For example, during Mitch in El Progreso, all resources went directly to the CODEM where all local people went to get support. This led to chaos. The El Progreso CODEM claimed that liaison with the CODELs has improved since they created three contact people for centralizing emergency relief to the CODELs. This improvement in communications was contested, however, by our discussions in the local case study areas: nobody in the Mico Quemado, Ulua River or Nacaome-Valle areas had noticed any presence of the CODEMs (nor of COPECO). Only two out of 41 people interviewed in the Ulua River area and seven out of 33 in Nacaome-Valle had any knowledge of COPECO's or CODEM's role in relation to natural hazards. Nobody in the Mico Quemado area knew about this. One explanation for this lack of awareness in Valle could be CODEM's focus in San Lorenzo on floods rather than droughts, which perhaps are relevant to more people in the area. However, capacity problems at the municipal level has proven to be a problem in relation to hazard management in other Central American countries as well (Wisner 2001).

Our local interviews also tried to establish whether the communities had, or knew of, any emergency, evacuation, or rescue plans, and whether there were established community emergency committees. In Mico Quemado, the interviewees reported that during Hurricane Mitch they knew of no active emergency committee, emergency plans, or evacuation or disaster drills in and for the communities. This was still the case at the time of the interviews. Nor did the local communities know of any emergency plans at the municipal level. The CODEM in El Progreso did claim to have developed a plan in 2001, but it was currently being revised, and they could therefore not provide us with a copy of it. The former version of the plan was, however, familiar to the people interviewed in the Ulua River area. The difference between the two case study areas was, most likely, a result of the focus of the emergency plan—floods in the lower part of the El Progreso municipality (FUNDEMUN and USAID 2001). For the El Negrito municipality, a summary report developed by CATIE (Centro Agronómico Tropical de Investigación y Enseñanza) was found in which the more critical sites for floods and landslides were mentioned with general recommendations for actions (Municipio de El Negrito - Yoro). A land use plan for the urban area was also found (CATIE). To members of the patronatos and communities in general these studies were, however, unknown at the time of our field work (April-May, 2003). There are, therefore, clearly weak links between the levels here; the plans that exist at the national and municipal levels are not familiar to the local level in the northern communities.

The Nacaome municipality also had a strategic development plan (FUNDEMUN et al.). Community strengthening and environmental projects were still in process according to this document; funds were needed for the projects to be implemented. FUNDEMUN (Fundación para el Desarrollo Municipal) also produced a report of the urban vulnerability to floods and landslides. This report was part of the Municipality Development Plan of 1999 and outlines the risk areas for the city of Nacaome (FUNDEMUN 1999). A Local Health Plan for Nacaome was also available. This plan included the objectives, activities and responsibilities for tackling different risk factors such as floods, water, debris and disease vectors. In several of

the villages in the municipality, booklets were found presenting villages' diagnostics in which past and future risk scenarios were listed. The lack of organisation to mitigate these potential risks was emphasised in the documents. These booklets were developed with the aid of the CAMI (Iniciativa Centroamericana de Mitigación) and CARE International projects (2002a). Again, the weak links between the municipal and local level were clear—local communities were not aware of the existence of any of this information. Given the literacy rates of the rural population in the area, access to this type of written information furthermore seemed difficult to achieve.

Unfortunately there were also weak links between the national and local levels in terms of emergency information. COPECO had developed guidelines for appropriate conduct before and after an emergency which could be found on their web site[20]. The guidelines included recommendations that span from the general (stay calm, avoid panicking, think first and then act) to the more specific (what to include in first aid kits, what things are needed to survive for two weeks in times of emergency). They also included more specific guidelines on what to think about before, during, and after floods, landslides, and hurricanes. Several "before-activities" related to activities of mitigation and environmental management (as opposed to immediate preparedness, such as to have a bag packed in case of emergency). Examples included (COPECO-b):

- Before a flood: "Do not live in areas identified as high risk areas"; "Contribute to the reforestation of green areas"; and "Periodically clean ditches, and canals."
- Before a landslide: "Do not buy property in areas with high landslide risk"; and "Cover the land with plants that grow rapidly and extend themselves easily in the terrain".

The advice provided is of a sort that most people, especially those that are poor, risk having difficulty following. For example, avoiding living in high-risk areas may not even be an option for most people who live there today—many people are forced onto marginal areas because the land tenure system does not allow them to be anywhere else, or because they cannot afford to move. In addition, to have emergency information on a web site in a country with not only a clear lack of computers and access to the internet, but also relatively low literacy rates, certainly seems less than effective.

3.6.1 Formal and informal institutions influencing local awareness of hazard management responsibilities and procedures

It seemed as if the primary reasons for the gap between the national initiatives and the local awareness were not institutions but other types of influencing factors. One such factor was the **lack of information**, or **miscommunication** that was noticeable within the area of hazard related interventions. At times, no, or little, information had been disseminated about the organisational structure, the different responsibilities, and the procedures to make it work properly. The poor awareness of emergency plans was another case where proper information could make a difference. Furthermore, information at the local level on how to adapt to a hazardous environment was to a large extent missing. Vulnerability to natural hazards at the local level can therefore be said to be higher than necessary because of this lack of coordination, support and information at the more aggregate levels.

Lack of communication was not only evident across levels; it also occured within the

[20] http://www.copeco.hn (Accessed in 2004)

same level. For example, the CODER in San Pedro Sula had severe difficulties getting any information from the El Progreso CODEM and thus knew nothing of the state of emergency planning and work in El Progreso. Others who had previously been involved with emergency work and the CODEM in El Progreso also commented on the lack of communication between the CODEM and CODER. In several cases, the CODERs were hardly known by the local population or at the municipal level. There could be many reasons for this, including a lack of information about the CODERs and their role, a difference in responsibilities causing collaboration to be weak, or low levels of interaction as a result of the absence of major natural hazards. Unfortunately, the results of the project do not cast any further light on this matter.

In the case of unfamiliarity of the organisation connected to hazard related interventions, a non-institutional factor can be found at the household level, however: **illiteracy**. This is a clear example of a bottom-up explanation for weak cross-level interactions. People who are illiterate are often more vulnerable than others because they can not read crucial emergency information such as who to turn to in times of emergency, who to call, and how to handle medical kits. All three case study areas suffered from relatively low literacy rates with approximately 70-75 % of both men and women being able to read and write. These levels were similar to the national average, which was clearly lower than the regional average for Central America of 89% (World Bank 2003). It should be noted, however, that high levels of illiteracy do not have to imply poor risk communication, even though education in general and illiteracy in particular were mentioned in the case study areas as important factors causing the local awareness of hazard management procedures and responsibilities to be low.

An informal institution which is a more general factor influencing the communication and connection among the societal levels in Honduras was a **culture of mistrust.** Throughout history, the Honduran population has "learnt" that they cannot expect much of their politicians, even of those who are democratically elected. It would therefore be too difficult for an individual to go against this norm, and the result was that everybody follows the norm of the group. Politicians rarely tried to listen to people's demands unless that person had some power of her/his own (as do the richer groups of society). The poorer rural population therefore seemed to expect nothing from their political representatives, and were therefore not aware either of any opportunities to demand more in terms of emergency planning and mitigation work.

4 Key insights

This study has examined the role of institutions in vulnerability to natural hazards in three rural communities in Honduras. The comparison of various changes over time and across societal levels offered particular insights into the influence of formal and informal institutions on the dynamics of vulnerability in local communities. A conclusion is that Honduras continues to be vulnerable to natural hazards today despite a number of positive changes since Hurricane Mitch in 1998. Considering that climate change seems to result in hurricanes becoming more severe makes an institutional change even more important. It is time for long-term adaptive strategies rather than short-term emergency efforts.

This final section outlines three main areas of key insights on; i) vulnerability as a combination of human and ecological factors; ii) institutional influences on identified vulnerability factors; and iii) cross-level interactions and vulnerability.

4.1 VULNERABILITY AS A COMBINATION BETWEEN HUMAN AND ECOLOGICAL FACTORS

A number of factors, both ecological and man made were, at the time of the study, shaping the vulnerability of Honduras with respect to natural hazards:

- **Ecological and climate related factors play a role in exposure to natural hazards.** Geomorphological and topographical conditions in Honduras cause landslides and soil erosion, and climatic conditions bring about hurricanes. In the Mico Quemado case study, more than 90% of fields were located on very steep slopes, a condition that will not change for most poorer households. Hurricanes also seem to become more severe over time, so rural communities in Honduras experience continued high exposure to natural hazards.
- **Deforestation is a key contributing factor to vulnerability.** Deforestation in Honduras has been more severe over the past few years than elsewhere in the region. The evidence from the impact of Hurricane Mitch also strengthened the apparent link between deforestation, floods, and landslides. Being one of the ecological conditions driven by humans, deforestation demonstrates the need for a change in underlying root causes, in this case institutions, in order to reduce vulnerability.
- **Formal hazard management has improved since Hurricane Mitch.** Most people interviewed agreed that COPECO had become better organised and that it has positioned itself more prominently within the field of hazard management. As it takes time for large organisations such as COPECO to reform fully, there were still challenges to be met, particularly at the municipal and local levels. Emergency committees at the municipal and local levels needed to be established and had to proactively contribute to the mitigation of natural disasters at all times, and not only function during times of disasters. Unfortunately, existing hazard management approaches are not communicated well enough to local vulnerable populations, creating a gap in cross-level interaction.
- **Internal social networks, especially migration, both reduce and increase vulnerability.** While migration may provide support in the short-term, through remittances and new living conditions, it is not a good solution to the problem. For most people, migration is a last resort for survival, and undertaken only when all other options fail. Depending

on the role of the people migrating, as well as their options for sustaining themselves and their families back home, it is not clear that vulnerability is actually reduced in the longer term through migration. The need for people to migrate to another area or country could possibly be minimised by improving people's access to a more diverse range of livelihood opportunities locally. Other types of social networks apart from those created as a result of migration also proved to play a central role to coping with Mitch in the case study areas.

- **There are differences in priorities relating to disaster preparedness and mitigation between national and local levels.** Longer term efforts to integrate natural hazard management with environmental management were only slowly being implemented. The result was a focus at the national and municipal levels on measures relating to short-term preparedness and response capacity rather than measures that would reduce community vulnerability in the long-term. This was in contrast to efforts at the local level, where there had been more effort to prevent hazards from becoming disasters. The national level focus on preparedness rather than mitigation is related to the general 'culture of short-term thinking' and frequent political changes. COPECO's poor resourcing also affected its capacity to fully fulfil its mandate of hazard related interventions.

4.2 INSTITUTIONAL INFLUENCES ON IDENTIFIED VULNERABILITY FACTORS

Institutional analysis casts light on the importance of a number of formal and informal institutions affecting the vulnerability of people in the case study areas. For example, the formal institutional structures relating to deforestation, land ownership, and migration are currently ineffective at reducing vulnerability.

- **The institutional structure governing deforestation and land tenure influenced vulnerability negatively.** The structure that existed was ineffective, partly because it created inequalities (as in the case for land tenure), partly because it discriminated against some groups in society (as in the case with the credit systems), and partly because informal institutions (such as the ones resulting in corruption) undermined the formal institutions. The current land tenure system, a key institution regulated at the national level, created the setting for continued deforestation and associated hazards. In the workshops there was agreement that secure land tenure would increase the number of coping strategies available, such as being able to sell a piece of land, diversifying livelihood strategies through growing different crops, and through access to credits. The formal institutional response to deforestation was also criticised by several of those interviewed. For example, most policies favoured conventional farming and short-term land use. Policies focusing on income generation, through the selling of timber or the rights to exploit forested areas, were another example. In addition, enforcement of forest protection laws was commonly weak and ineffective.

  Corruption and distrust affected many of the factors shaping and defining vulnerability to natural hazards. Traditional attitudes and a culture spread by transnational companies tended to regard forests and trees as resources with limited value and hence hindered the effectiveness of those formal institutions that aimed to address deforestation. Even in cases where the formal institutions appeared effective on paper, their actual influence was limited. Many people therefore said that it was not laws that needed changing, but the

corrupt system and the attitudes which guide people's behaviour.

- **A credit system inaccessible to small and poor farmers increases vulnerability.** Only eight of the interviewed households had access to credit due to the bureaucratic and demanding system surrounding credit. In the north, several improvements in the credit system and related activities in order to reduce the vulnerability of rural people to natural hazards were mentioned, including:
  - o training in technical and administrative credit management;
  - o shortening the administrative process for obtaining credit;
  - o assigning credit linked to land management practices, location, farm size, accessibility and other biophysical variables;
  - o allowing farmers' associations access to credit collectively but with individual responsibilities;
  - o reducing tax rates on credit (there are different tax rates for each crop);
  - o changing the policy of debt cancellation (*condonaciones*). Beneficiaries should be those with fewer resources and less capacity to repay loans;
  - o assigning credit to improvements in technology such as irrigation systems, and the use of machinery for land preparation and other management practices.

  In the Nacaome-Valle workshop, people called for allowing international organisations to monitor, regulate and follow up the national credit system. In general, there was a strong feeling among the interviewees and participants in the workshops that the credit systems were subject to corruption and mismanagement, and credit was assigned in a biased way. Participants also felt that more women should have access to credit.
- **Migration was not discouraged by the institutional structure.** Realising migration will not disappear as a coping strategy, changes in the formal institutional structure related to migration (such as the regulations for the financial systems involved in sending and receiving remittances) could be reviewed so as to be of greatest possible support for those people for whom migration is the only survival strategy.
- **Both formal and informal institutions were highly influential in the role taken by municipalities in hazard management.** The framework guiding the administrative structure of the municipalities was partly to blame for the lack of integration of natural hazard planning in the overall development plans for the municipalities. The responsibility of the municipal planning process was to a large extent located at the national level—development plans for the municipalities are the responsibility of FUNDEMUN and its interaction with the local authorities was still weak. In addition, those sectors or aspects that other organisations or authorities were responsible for (such as health, education, or natural hazard mitigation and preparedness), were commonly not included by FUNDEMUN in their plans for the municipal development. The formal institutional structure surrounding hazard related interventions therefore existed to a large extent, but informal institutions (as well as some other factors) seemed to be undermining its effectiveness. An example was a fear of losing power which could possibly be the reason for the observed reluctance on the part of the CODEM to collaborate with NGOs in the case study areas in the north.

4.3 CROSS-LEVEL INTERACTIONS AND VULNERABILITY

Discussions so far have highlighted a number of institutions, and other factors, that cause cross-level interactions to be weak, and thereby vulnerability to be high. All of these failed cross-level interactions increased local communities' vulnerability to natural hazards.

- **The municipal level was weaker than the other levels resulting in ineffective cross-level interactions.** A lack of resources, reducing the municipalities' capacity to engage effectively in hazard management and environmental management, was one of the reasons. Others were more internal, based on the highly political context that governs the municipalities. For example, a fear among the mayors of losing power to the CODEMs was mentioned by an international NGO representative as one reason why their work has not proceeded further. While this was only mentioned by one person explicitly, it was evident in several cases, including in the interview with the El Progreso CODEM. The local level interviews pointed out that the CODEM in El Progreso is limited by political influences. This resulted in less support to Mico Quemado (since nobody from that area was part of the government), and in radical changes after each election. Collaboration with external partners, such as NGOs also seemed to be avoided in order not to weaken the power of the municipalities. In relation to hazard related interventions, it also became clear that the CODEMs were relatively poorly organised, only assembling in times of hazards, with little emphasis on mitigation and long-term involvement in disaster mitigation.

- **Despite improvements in formal hazard management, local communities are still poorly aware of procedures and responsibilities.** Few people in local communities were aware of any existing emergency plans, and many were confused about which organisation was responsible for hazard management. Less than 20% of those interviewed in the case studies had any knowledge of COPECO's or CODEM's role in natural hazard interventions. Nor was there much awareness of the local level organisation—the CODELs—or local emergency plans. Time seemed to be of relevance, perhaps not as a factor causing the knowledge gap, but certainly as a factor explaining why it was still present. At the time of the field work, it was only five years since Hurricane Mitch hit Honduras and at that time COPECO was marginalised and run by the military. This has now changed, but it takes time for such changes to filter their way through the levels and take effect. An involvement of NGOs, civil society organisations and patronatos – organisations close to the local communities –in information dissemination and communication could potentially lead to better results.

- **External social networks were not as central to vulnerability alleviation as internal social networks.** Because of the lack of support from external sources experienced by many people during Hurricane Mitch, several interviewees at the local level indicated the importance of personal social networks in coping with the disaster. Migration especially had created extended social networks, and had also increased individual and national dependence on remittances.

- **The formal institutional structure at the national level was too weak to support local resilience.** The ineffective formal institutional structure in relation to deforestation, land ownership and migration weakened cross-level interactions and maintained local people's vulnerability to natural hazards. Those without a property title may not have access to farmland in times of disasters and no, or only limited, access to credit. The existing land

tenure system thus contributed to people's sensitivity, because many depend on land for their livelihoods. In addition, land ownership provides access to several other coping strategies since it can be traded for other resources. Migration resulted from a lack of external support, indicating a clear failure in cross-level interactions.

- **Top-down and bottom-up influences are not enough integrated to alleviate vulnerability.** While the responsibility for many of the failures in cross-level interactions was at the national and municipal levels, household level factors were also responsible. One such factor was widespread illiteracy, which clearly hindered the communication of information about emergency planning and procedures to the local population.

In conclusion, the continuing high impact of natural disasters in Honduras is a symptom of complex interactions between multiple environmental and societal challenges in the country. Experience says that losses from hazards are caused by short sighted and narrow conceptions of the human relationship with the natural environment. To address these shortcomings, the nation must shift to a policy of "sustainable hazard mitigation." This concept links wise management of natural resources with local economic and social resilience, viewing hazard mitigation as an integral part of a much larger context, rather than simply being about technological solutions. (Mileti 1999: p. 2)

COPECO could take a longer term and more integrated perspective on natural hazard management, giving more attention to strategies that will prevent future natural hazards from becoming disasters. Environmental management and hazard management should be considered in an integrated and holistic approach. Vulnerability reduction measures and natural hazard management also need to be mainstreamed in the wider development planning process. This also means that vulnerability reduction needs to be seen as a long-term high priority commitment that should be maintained independently of political change.

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Annex 1. Questions for local level interviews

INTERVIEW QUESTIONS ON VULNERABILITY, HONDURAS, 2003 (VERSION 3)

No. of original interview

Name of farmer (head of household)

Sex (F/M)

Date (D/M/Y)

Name of community

Background

How many people live here?

How many people are part of the family?

How many years have you lived here?

What reasons do you have for living here?

Do you live here due to Mitch or some other type of natural hazard?

How many of those from here generate an income for the family? Men:__ Women:__

Type of housing + distance from the hazard source (zinc roofing; bahareque; wood; cement)

Detailed characteristics on each family member living here, and Education

Person (incl. Head of family)

Sex (F/M)

Age

Do those >15 read and write? (Y/N)

Education (Primary; Secondary; Technical)

Health (Good, Regular, Bad)

Changes in health due to Mitch (Better, Same, Worse)

Did you implement any strategy to handle the hazard in a better way? Which?

Have there been changes in the composition of the family during the last 6 years? (Sex; Year) (Births; Migration (due to Mitch); Deaths; In-migration)

For those who have migrated, specify whether the migration is Temporal, Seasonal or Permanent (Sex)

Role or occupation?

To where?

Do they send money? (Y/N)

Has the level of well-being among family members become better or worse with the migration?

List three factors that are affecting the quality of life adversely in this location

Infrastructure and services (Transport; Supply of potable water; Energy supply; Sanitary services (latrines); Communications (telephone); Health services; Credit services Car insurance)

State for each service the Access (Y/N) and Quality (Good, Regular, Bad).

Have there been substantial improvements after Mitch in the delivery and/or quality? (Better, Same, Worse)

Transport: Type? Time to reach the nearest populated area in minutes or hours?

Supply of potable water: Type of access (Aqueduct, pipes, river, rivulet, well, other)? Time spent on collecting water each day? Quantity of water collected or used?

Communications: Time to get to nearest phone?

Health services: What is the closest health centre? Time to get to nearest health centre?

Biophysical conditions and natural risks (referring to the individual households)

Do you perceive your land as prone to environmental problems/natural hazards? (Y/N) Which ones?

Are you investing in recovery measures to control environmental problems or natural risks? (Y/N)

If yes, what type of investment?

Characterise the conditions of the land that you use (Access of water for irrigation (Y/N); Soils (Fertile; Average; Poor)

Characterise any changes that have occurred since Mitch (Improvement; Equal; Worse)

Natural hazard related aspects

What are the largest crises or disasters that you remember? When did it occur? (Year)

Describe them in order of importance. Which one was the most important and why?

In terms of the most important, did it affect you? (Y/N) If yes, how?

Did you receive any help? (Y/N) If yes, what?

Was the help enough? (Y/N) Why?

What projects/plans emerged from the previous disaster?

Did any type of committee for attention or prevention of disasters exist in the community? Which one?

Is it working? (Y/N) How long has it been working?

Does any type of plan for attention and emergency in case of disasters exist? (Y/N) If yes, explain

Does any disaster prevention programme exist?

Was any type of training performed? (Y/N)

Do you belong to any committee or group in the community that work with emergencies or disasters? (Y/N)

Does the family, or a family member, have a role or responsibility within the community? (Y/N) If yes, which one?

Do you feel more secure today compared to six years ago? Do you feel more in control of the situation of an event such as Mitch would reoccur? (Y/N) Why?

If another event such as Mitch would occur again, mention three things you would do.

Land tenure, use and management

Have you made changes in resource management practices? (Y/N) If yes, what changes?

Have there been changes in land tenure in the community? (Y/N) What changes?

Specify whether you, during the last years, have worked on your Own land, Rented land, Shared land, or Neither (Before Mitch; Today)

Do you consider yourself having a better situation today in terms of land tenure? (Y/N)___

Why?

Total area of own land today and before Mitch?

State how the use of land is today compared to before Mitch (Better; Worse; Same) (Crop land; Fallow land; Pasture; Forest)

What do those changes signify in terms of survival strategies?

How many percent of the production is for: Cultivation; Subsistence farming; Farming for markets? (%)

State the main sources of income during the last six years (Own land, Rented land, Other activities) (Before/After Mitch; Activity during Rainy season/Summer)

If the source of income/activity has changed, why?

Annex 2. Questions for workshops and focus group meetings

WORKSHOP QUESTIONS

Deforestation:

Which are the causes of deforestation?

Which are the consequences?

Has this always been the same?

Land tenure:

List the different forms of land tenure in the area.

Which are more affected by disasters?

Land and credits:

How could land tenure and credit system be modified in order to reduce the vulnerability of population?

Land and water management practices:

Which agricultural practices, including land and water management, could reduce vulnerability and which institutions should take the leadership in its implementation?

How could the following groups – local inhabitants, NGOs, and governmental organisations – be organised internally and among them to reduce the impact of a disaster as drought or floods, or winds?

Hazard related interventions:

What was lacking before, during and after Mitch to reduce the impact that it had?

Migration:

Is migration seen as a problem or as a solution in relation to vulnerability to natural hazards? What would be a

better alternative?

Organisation:

How can organisations at different scales (internally and among them) be organised in order to reduce the impact of disasters such as droughts, floods, and landslides.

Are we prepared for a new Hurricane Mitch?
Which five actions are the most important to help reducing vulnerability to a new Hurricane Mitch?

FOCUS GROUP THEMES

Community and people's history
Do you know who were the first inhabitants in this community?

Population
How is the family composed?

Services: Health, water, energy (lights), and education
Have you ever been to the health centre?

Do you know that you live in a reserve?

What illnesses are the most common here?

What do you do when the children get ill?

Deforestation
Does the collecting of fire wood affect the water?

Are many trees harvested?

What does the rest of the group think of this?

Natural disasters
How did Mitch affect you?

What did you do to resolve the problem?

What other disasters do you remember?

Gender
Who decided what to buy?

Who takes the most care of the children?

Who decides what to sow?

Who suffer the most – the women or the men – during a disaster such as Mitch?

How do you perceive the distribution of tasks?

What activities different from work do you have?

Do you think that the men think that the women today are part of one group with the men? What can be different?

Aid Migration Institutions
Land tenure and different forms of property rights – Which are private lots, governmental or national lots, ejidales and rented land

Annex 3. List of interviewees and workshop participants

LOCAL INTERVIEWEES

Mico Quemado, November 2002	Ulua River, April 2003	Nacaome-Valle, May, 2003
Amaya, Asunción	Alcerro, Dionisio	Aguilar, Maria Guadalupe
Arguedas, Maria Felicitas	Alfaro, Rosa Amelia	Aguilera Cardenas, Maria Martín
Arriaga, Jorge	Amaya, Carlos	Alvarado, Maximina
Arriaga, Ovidio	Arellana, Linda	Barahona, Doris Araceli
Guardado Viera, Medardo	Arias, Rolando	Canal, Carmelina
Hernández Lemus, Benedicto	Bueso, Carlos	Cardenas, Ana Lourdes
Hernández, Aminta	Calderon Robinson, Dennis Eduardo	Cardenas, Petronila
Hernández, Jose Antonio	Calis, Jacinto	Castillo, Carlos Alfredo
Hernández, Maria Isable	Canales, Alfonso	Chamorro, Suyapa
Hernández, Raul	Castro, Maria Victoira	Cifuentes, Candida
Lemus, Johny	Contreras, Julia	Cruz, Melkicidet
Lemus, Maria Elvira	Contreras, Oscar Anibal	Gonzales, Ana Maria
Lemus, Marvin	de dios Ramírez, Juan	Hernández, Suyapa
Lemus, Teofilo	Duarte, Anacleto	Jiménez, Pascuala
Lopez, Nestor	Escalante, Arcadio	Jiménez, Rosita
Morales, Henry	Fuentes, Adolfo	Leon, Victoria
Orellana Hernández, Jesús	Gonzales, Blanca	Lopez, Amanda Isolina
Orellana, Carlos	Guevara, Claudia Azucena	Lopez, Claudia Yamilet
Orellana, Maria Amalia	Guillén Chinchilla, Oscar	Madilla, Julia
Orellana, Maria Angela	Lazo, Avelino	Martinez, Daniel
Ortega, Maria Lidia	Lopez, Elvia	Mesa, Margarita
Padilla, Rodolfo	Lopez, Ignacio	Montoya, Angel
Rodríguez, Lidia	Madrid, Carlos	Munguilla, Balbina
Rosales Ortega, Virgilio	Martinez, Adrian	Muñoz, Mirna
Rosales, Esperanza	Martinez, Eugenia	Nau Arriola, Jose
Serrano Uria, Jesús	Martinez, Fausto	Núñez, Ana Isable
Serrano, Dionisio	Maya, Eduardo	Orellano, Maria Adela
Serrano, Edilberto	Mejia, Francisco	Suyapa, Iris
Uria, Maria Santos	Mencia, Feliz	Vega, Beatriz
Urias, Jose Maria	Montoya, Maria Rufina	Velásquez, Dionisia
Viera, Doria	Moreno, Marcelino	Villalobos, Toribia
Zamora, Leoncio	Murillo, Jessica	Villatoro, Elis Marina
	Orellana, Juana Madrid	Yamile, Fatima
	Ortiz, Andres	
	Pineda, Maria Idalia	
	Robles, Aquilino	
	Sabala, Giovanni	
	Trochez, Andrea	
	Valle, Ramon Antonio	
	Villatoro, Emilda	
	Villatoro, Jesús Alfonso	

NATIONAL AND MUNICIPAL INTERVIEWEES

Name (and title) of interviewee	Affiliation	Date and location
Alvarado, María Elisa (Director General) and Oscar Fernández (Manager)	Cruz Roja Hondureña; Oficina para la Prevención de desastres y emergencias	May 7, 2003, Tegucigalpa
Alvarez, Jorge Sebastián (Mayor) and Ribeiro Santos (Ex-Governor)	Nacaome municipality	May 12, 2003, Nacaome
Argeñal, Juan Fransisco (Sub-Commissioner)	COPECO, Regional #6	May 14, 2003, Jicaro
Barrett, Curt (Manager, NWS International Hydromet Projects)	National Oceanic and Atmospheric Administration	May 21, Silver Spring
Bendek, Juan Antonio (Ex President of COPECO)		November 6, 2002, El Progreso
Clarke, Caroline (Senior Specialist, Disaster Prevention and Risk Management)	Inter-American Development Bank (IDB)	May 20, 2003, Washington, DC
Cruz, Antonio (Jefe de Desarrollo Comunitario), Magdaleno Guevara (Asistente Medio Ambiente) and Lizette Reyes (secretaria CODEM)	El Progreso Comité de Emergencia Municipal (CODEM)	April 30, 2003, El Progreso
Eriksson, Ina, Helena Lindqvist, Alfredo Stein, Katrine Larsen and Claes Norrlöf (Staff)	Swedish Embassy	May 5, 2003, Tegucigalpa
García, Eswitch (Presidente Ejecutivo)	Asociación Hondureña de Desarrollo Ecológico y la Seguridad Alimentaria (AHDESA)	April 30, 2003, El Progreso
García, Justo (President)	El Comité para la Defensa y Desarrollo de la Flora y Fauna del Golfo de Fonseca (CODDEFFAGOLF)	May 13, 2003, San Lorenzo
Girón, Max	Asociación de Municipios de Honduras (AMHON)	May 8, 2003, Tegucigalpa
Giron, Norberto (Encargado de Oficina) and Jorge Sagastume (Coordinador Tecnico)	Organización Internacional para las Migraciones (OIM)	May 7, 2003, Tegucigalpa
Gómez B., Luis (National Commissioner) and Hugo Arévalo (Assistant Commissioner)	Comisión Permanente de Contingencias (COPECO)	May 9, 2003, Tegucigalpa
Gonzales Cerdeira, Yolanda (Rural Area Coordinator)	Equipo de Reflexión, Investigación y Comunicación de la Compañía de Jesús en Honduras (ERIC)	April 30, 2003, El Progreso
Gonzalez, Carlos (Sub-Commissioner)	COPECO, Regional #2	XX, 2002, San Pedro Sula
Gonzalo, Mauricio Alvarado (Mayor), Mejia, Carlos Roberto (Head, Human resource dept.), Romel Ferrufino (Asistente Medio Ambiente) and Oscar ?? (from Fundemun)	San Lorenzo, Mayor's office, UMA & Fundemun	May 15, 2003, San Lorenzo
Gussenhoven, Sjef (Director)	Servicio Holandés de Cooperación al Desarrollo (SNV)	May 6, 2003, Tegucigalpa
Hearne, Peter (Oficial de Medio Ambiente) and Raymond Waldron (Director, Agricultura y Recursos Naturales)	Agencia de los Estados Unidos para el Desarrollo Internacional (USAID)	May 7, 2003, Tegucigalpa
Irías, René	Instituto para la Cooperación y Autodesarrollo (ICADE)	April 28, 2003, El Progreso
Juarez, Manuel (Manager)	Cruz Roja, San Lorenzo	May 12, 2003, San Lorenzo
Keipi, Kari (Natural resources specialist)	Inter-American Development Bank (IDB)	May 20, 2003, Washington, DC
Mealer, Jorge (Presidente)	Bless the Children	April 29, 2003, El Progreso
Mejia, Carlos Roberto (Head, Human resource dept.)	San Lorenzo CODEM	May 15, 2003, San Lorenzo
Molina R., Edwin Mateo (Especialista Local en Recursos Naturales y Ambiente)	Inter-American Development Bank (IDB)	May 5, 2003, Tegucigalpa

Ochoa, Leticia	United Nations Development Programme (UNDP)	May 12, 2003, Nacaome
Owen, Joseph (Resident Representative)	World Bank	May 6, 2003, Tegucigalpa
Ramos, Cecilio (Presidente Junta Directiva) and others	Palmas Aceiteras de Honduras (HONDUPALMA)	April 30, 2003, El Progreso
Regalado, Fransisco and Arturo Brand	Proyecto de mejoramiento ambiental de desarrollo rural de Honduras (PROMADERAH)	April 30, 2003, El Progreso
Reyes, Hugo (Independent consultant)		May 8, 2003, Tegucigalpa
Rivas, Carlos (Independent consultant)	Recursos Naturales y Manejo de Cuencas, Green Pro Ambiente y Desarrollo	May 5, 2003, Tegucigalpa
Rosales, Javier	Save the Children	May 14, 2003, San Lorenzo
Rubio, Ever	United Nations Development Programme (UNDP)	May 12, 2003, Nacaome
Vasquéz, Aníbal Godov (Ingeniero Geólogo Consultor)	Secretaría de Recursos Naturales y Ambiente (SERNA)	May 8, 2003, Tegucigalpa
Vélez, Beatriz (Coordinadora de Proyecto)	Disminución de la Vulnerabilidad y Preparativos para Desastres, Pan American Health Organisation (PAHO)	May 6, 2003, Tegucigalpa
Yanes, Herbert (Officer) and Willmer Reynaldo Turcios (Assistant)	Vulnerability Analysis and Mapping (VAM), United Nations World Food Programme (UNWFP)	May 8, 2003, Tegucigalpa

PARTICIPANTS IN WORKSHOP 1: MICO QUEMADO AND ULUA RIVER WORKSHOP (MAY 2, 2003), HOTEL CASA BLANCA, EL PROGRESO, YORO.

Name	Address	Affiliation
Alvarez, Pablo	El Progreso, zona la compañía	ERIC
Caceres, Heriberto	El Progreso	PROMADERA
Canales, Marvin Antonio	Urraco Norte, la 29	Centro Nazareth
Carcamo, Roberto	Barrio Las Delicias	ADHESA
de Jesús Perez, Omar	Barrio San Jose	ICADE
Diaz, Victor Manuel	Urraco, Pueblo	ERIC
Fuentes, Medardo	Bario Los Pinos, El Progreso	ADHESA
Funez, Antonio	Olivos, San Antonio	ADHESA
Garcia, Efraín	El Progreso Yoro	ADHESA
Garcia, Jose Antonio	Veracruz, Paloma	CRECER
Hernández, Sergio	Barrio San Jose	ICADE
Hurtado, Liliana	Cali, Colombia	Consultant
Lainez, Rigoberto	El Porvenir, Norte	FEDEPAPRO
Lopez, Monico	Comunidad Mocula	ARPVL
Mendoza, Francisco	Barrio Las Delicias	ADHESA
Molina, Modesto	El Progreso	ERIC
Ochoa, Noe	El Progreso	ADHESA
Ramírez, Gilberto	Cordillera Mico Quemado	PROMADERA
Ramos, Gilberto Ramos	El Negrito, Yoro	Pescadero
Rubiano, Jorge	Cali, Colombia	CIAT
Segnestam, Lisa	Stockholm, Sweden	SEI

Simonsson-Forberg, Louise	Stockholm, Sweden	SEI
Savala, Giovanni	La 10, Guanchias	Empresa La Amistad
Ulloa, Manuel	Olivos, San Antonio	ADHESA
Vasquez, Marco Antonio	El Negrito, Yoro	CRECER

PARTICIPANTS IN WORKSHOP 2: NACAOME WORKSHOP (MAY 16, 2003), CRUZ ROJA BUILDING, NACAOME, VALLE.

Name	Address	Affiliation
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Alvarez, Dennis	UMA Nacaome	Acaldia Nacaome
Bacca Flores, Victor	San Lorenzo	Casa Cural
Cruz Castro, Melquisided	Guayabo 1	Presidente Patronato
Ferrufino, Romel	UMA	Alcaldia San Lorenzo
Gomez, Danilo	3 de Febrero, Mayo Marcovia	
Hernandez, Ma Antonio	Cruz Roja	Nacaome
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Mejia, Jose	Nacaome	Cruz Roja
Montoya, Angel	Guayabo N1	
Morales, Maria Milagros	Stockholm, Sweden	SEI
Ochoa, Modesto	Promotor Cohdefor	AguaCaliente El Triunfo, Choluteca
Rosales, Javier	San Lorenzo	Save the Children
Rubiano, Jorge	Cali, Colombia	CIAT
Rubio, Ebert	Nacaome	UNDP
Segnestam, Lisa	Stockholm, Sweden	SEI
Simonsson-Forberg, Louise	Stockholm, Sweden	SEI
Velazquez, German	Nacaome	Cruz Roja
Via Toro, Celso Alcide	Nacaome, Santa Erlinda	Comidad Santa Erlinda
Zeron, Antonio	Los Langes, Amapala	Comunidad Los Langes

Annex 4. COPECO network

No.	Comites de apoyo	1 Monitoreo y alerta	2 Comunicaciones	3 Busqueda, rescate y evacuacion	4 Seguridad	5 Transporte	6 Albergues temporales y alimentacion	7 Edan	8 Salud	9 Materiales peligrosos	10 Proteccion forestal	11 Gestion de la cooperacion internacional
1	Comisión Permanente de Contigencias	C	C					C			A	A
2	Fuerzas armadas		A	C	A	A	A	A	A	A	A	
3	Cuerpo de bomberos		A	A				A	A	A	A	
4	Cruz Roja Hondureña		A	A			A	A	A			A
5	Cruz Verde Hondureña		A	A			A	A	A			
6	Secretaría de Salud		A				A	A	C	A		
7	Corporación Hondureña de Desarrollo Forestal	A	A			A		A			C	
8	Secretaría de Educación						A	A			A	
9	Empresa Nacional de Energía Eléctrica	A	A				A	A				
10	Gobernaciones							A			A	
11	Policía Nacional Preventiva		A	A	C		A	A		A	A	
12	Hondureña de Telecomunicaciones		A					A				
13	Radio Aficionados		A					A				
14	Municipalidades						C	A			A	
15	Servicio Meteorológico Nacional	A						A			A	
16	Secretaría de Recursos Naturales y Ambiente	A				A		A		C	A	
17	Universidad Nacional Autónoma de Honduras	A					A	A	A			
18	Servicio Autónomo Nacional de Acueductos y Alcantarillados	A	A				A	A	A			
19	Comisión Nacional de Telecomunicaciones		A					A				
20	Asociación Scouts de Honduras			A			A	A				
21	Comités de Apoyo a la Seguridad				A			A				
22	Secretaría de Obras Públicas, Transporte y Vivienda					C		A				
23	Secretaría de Agricultura y Ganadería					A		A		A	A	
24	Fondo Hondureño de Inversión Social					A	A	A				
25	Instituto Nacional Agrario					A		A				
26	Aereonáutica Civil					A		A				
27	Empresa Nacional Portuaria					A		A				
28	Instituto Hondureño de la Familia						A	A				
29	Organizaciones No Gubernamentales (ONG's)						A	A				A
30	Secretaría de Relaciones Exteriores						A	A	A			C
31	Secretaría Técnica de Cooperación Internacional						A	A				A
32	Instituto Nacional de Formación Profesional						A	A				
33	Secretaría de Gobernación y Justicia							A				
34	Instituto Hondureño de Seguridad Social							A	A			

The Stockholm Environment Institute (SEI)

SEI is an independent, international research institute specializing in sustainable development and environment issues. It works at local, national, regional and global policy levels. The SEI research programmes aim to clarify the requirements, strategies and policies for a transition to sustainability. These goals are linked to the principles advocated in Agenda 21 and the Conventions such as Climate Change, Ozone Layer Protection and Biological Diversity. SEI along with its predecessor, the Beijer Institute, has been engaged in major environment and development issues for a quarter of a century.

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