

Natural Disaster Lessons Learned: A Review of USAID Disaster Assistance Documentation

1. GENERAL

1.1. General Lesson:

- Flood and drought disasters have distinctive features which impose differing response requirements. Similarly, earthquakes, hurricanes, and other disasters can produce different phenomena with varying response requirements. Even with respect to the same type of disaster, the way in which assistance should be furnished may vary substantially from one situation to another depending on country specific, even region or department specific factors (Checchi and Company, 1987, p. 2.)¹

2. RELIEF PHASE

2.1 Search and Rescue²

2.1.1 Mobilization (USAID OFDA, 1987, pps 5-7)

- Advance Briefing: People will be better prepared to carry out emergency relief assignments effectively, if they are well informed. Suggestions are to: transmit available information to emergency personnel prior to departure; develop a briefing packet to give to emergency personnel at departure, and USAID Mission staff should brief emergency personnel upon arrival in the country.
- Dispatch Sufficient Personnel: Sufficient personnel should be dispatched to provide adequate search coverage early in the incident and adequate staffing of shifts later in the incident to insure that people receive adequate rest.
- Pre-Position Support Equipment: Have equipment available in countries so they can be dispatched to search and rescue personnel. Suggested items: tents, food, radios, hard hats, gloves, flashlights, first aid kits, water purification kits, sleeping bags, respiration masks, mosquito netting, medication for dogs, personal survival kits and fresh water.
- Timely Dispatch: Measures should be taken to line up various transportation options to avoid delays.

2.1.2 Emergency Management (USAID OFDA, 1987, pps. 7-8)

- Implement an Emergency Management System: It is important to dispatch a command team that can organize all of the planning, logistic and operational requirements related to the disaster. An emergency management system would: provide a communication team, establish a de-mobilization process; facilitate relief efforts of donors, and fulfill the public relations role. This type of

emergency management organization allows the search and rescue teams to concentrate primarily on finding survivors.

2.1.3 Incident Support (USAID OFDA, 1987, pps.8-9)

- Develop Uniform: A uniform would readily provide visual recognition of team members, host government officials, international donors, other emergency relief personnel and the media.
- Dispatch Communication Equipment (Satellite System and Radios): Procedures need to be established in advance to provide for the dispatch of satellite and radio equipment with trained operators.
- Provide Adequate Heavy Rescue Equipment: A process needs to be implemented that verifies each stage of an order from request to receipt.
- Inform Missions of Emergency Roles and Responsibilities: Mission personnel need to understand their roles and responsibilities, and those of OFDA, in responding to disasters.
- Re-Condition Search and Rescue Equipment: Need to know procedures for volunteer groups to get their support equipment refurbished following a disaster relief assignment.
- Provide Atmosphere Detectors and Self-contained Breathing Apparatus When Appropriate: A checklist of personal protective equipment should be developed for various disaster types to use as a dispatching guide.
- Develop International Search and Rescue Standards: International search and rescue standards could be helpful in designing training, qualifying search and rescue personnel, conducting operations, and coordinating the efforts of international donors.

2.1.5 Training (USAID OFDA, 1987, pps. 10-11)

- Develop Search and Rescue Simulation Training For Dog Teams in a Rubble Environment: Most dogs are trained in a wilderness environment, so a simulated rubble environment for training would be helpful.
- Identify and Train People to Operate an Emergency Management System: An emergency management system would handle potential problems areas such as communications, international coordination, public relations, de-mobilization and in-country logistic support.

- Train Embassy Personnel to Make Effective Assessments of Emergencies: Training, checklists, or briefing guidelines could be developed to better prepare people to provide preliminary assessments.
- Schedule one-day OFDA Orientation Session for Dog Handlers: Train dog handlers and coordinators on established disaster relief procedures related to mobilization, emergency management organization and incident support.
- Plan for Dog Handler Trainee Assignments on Dispatches: Establish a pool of trainees for search and rescue assignments.
- Determine Feasibility of a Training Environment for Dogs with Cadavers: Most dog training is with living "victims". Training with cadavers would be helpful.
- Provide Cross-training Opportunities: Schedule training during disaster relief efforts to enhance credibility, trust, and understanding among search and rescue personnel.

2.2. Short term/relief

- Damage to existent infrastructure, especially roads, should be immediately repaired to facilitate access to people affected by the disaster, and to clear peoples' way to their respective homes (USAID El Salvador, 1999, p. 5).³
- Disaster relief activities are more effective when host country governments make a clear distinction between emergency and on-going development activities and, as a result, waive the wide range of bureaucratic procedures (either by Emergency Decree or on an ad hoc basis) that impede procurement of commodities, employment of labor, etc. (Crowe and Jeffers, 1987, p. 4).⁴
- Determine at the outset which of the four critical functions performed during emergency situations (assessing need, ensuring availability, ascertaining accessibility, and planning and managing logistics) can be controlled, which can be partially controlled, and which are externally controlled (or uncontrollable). Assessment of the type and magnitude of needs can be controlled. Ensuring availability of goods and services required is only partially controllable. Ascertaining accessibility and determining channels of distribution is also only partially controllable. The function of planning and managing logistics to deliver the goods is controllable but dependent on the functions of needs assessment, availability, and accessibility. Accepting that availability and accessibility can only be partially controlled, the logistics function becomes more dependent on needs assessment to operate effectively. (Louis Berger, 1988, pps. 77-78.)⁵
- A rolling plan for staff, equipment and commodity levels must be used in emergency relief efforts where targets cannot be fully ascertained at the outset. (Mason, 1994, p. v)⁶

- Timing is crucial in emergency relief response. Delays in funding and implementation can have a disproportionate effect on the rapidity of the response. (Mason, 1994, p. vi)⁷
- Local private contractors should be considered as alternatives to government work forces for implementing emergency assistance programs... The private sector offers a distinct advantage in its ability to mobilize resources, especially in rural areas, to respond to emergency reconstruction requirements (Crowe and Jeffers, 1987a, p. 28).⁸
- Bolivia's [emergency] food assistance program included a special allocation of Title III food for sale for price stabilization in urban areas, a Title II food-for-work program, and a title II monetization program. The Title III sales achieve price stabilization... The Title II Food-for-Work Program was instrumental in averting serious malnutrition and keeping many peasant families in their villages. Rice available under the Title II monetization program was sold to villages that had been largely missed by the food-for-work program (Checchi and Company, 1984, p. ES-2).⁹
- For emergency food programs, the number of commodities should be limited to no more than three or four which have high acceptability among beneficiaries, and agencies should be encouraged to move food expeditiously even if one or two commodities have not arrived so as to avoid any delay in distribution (Checchi and Company, 1984, p. 13).¹⁰

3. RECOVERY PHASE

3.1 Management

3.1.1 Focus and Commitment

- Clear Project Focus: A clearly focused project is important for effective project implementation. (USAID Jamaica, 1989, p. 7)¹¹
- Isolate/narrow down areas of activity. (USAID El Salvador, 1991, p. 5)¹²
- Establish a balance for immediate needs and long-term recovery (e.g. financing design of high priority facilities) for later financing. (USAID El Salvador, 1991, p. 5)¹³
- Review-anticipate design constraints. Call in design expert early. (USAID El Salvador, 1991, p. 5)¹⁴
- Creation of a Project Financial manager position helped expedite project implementation. (Lazar, 1993, p. 4)¹⁵

- Mission commitment is important to the effective implementation of a program, and oversight responsibility needs to be clearly stated. (Mason, 1994, p. vi)¹⁶
- The project manager was the right person and that he stayed on the job from start to finish was a key ingredient to the project's success. (Lazar, 1993, p. 4)¹⁷
- Educational Side Effect: Good to have project managers participate in the entire range of a project from design through implementation and close-out. (USAID Jamaica, 1989, p. 8)¹⁸
- National professional personnel can be used to an advantage in high-level project management positions. (Lazar, 1993, p. 4)¹⁹
- Decentralization: Focus a large amount of time on project management in a short timeframe by assigning responsibility for each project component to different mission offices for execution. (USAID Jamaica, 1989, p. 6)²⁰

3.1.2 Implementation Approaches

- With substantial effort and funding required to rebuild, obtaining authorization for a special reconstruction objective may facilitate the best use of funds (USAID Haiti, 2002, p. 5). Among other advantages, this permitted the formation of a strategic objective team, the development of a specific, detailed program with a monitoring plan, emphasizing reducing vulnerability to future disasters (SECID, 2002, p. 2)²¹
- Time limitations on funding may reduce impact. Hurricane Mitch funding had a two year time limit. The Guatemala mission found that the infrastructure projects were expected to endure and sustain impact. However, some of the economic and social activities would have benefited from a longer project cycle, including consolidating the national system of disaster coordination, and watershed rehabilitation activities including reforestation. (USAID Guatemala, 2002, p. 6). The El Salvador mission found that there was reduced community participation and learning at all stages due to the need for accelerated implementation (USAID El Salvador, 1999, p. 5). The El Salvador and Haiti missions decided to fund additional activities that continued reconstruction (USAID Haiti, 2002, p. 23; USAID El Salvador, 1999, p. 5). However this may not always be possible for a mission given the (non-emergency) strategic objectives for the country.²²
- Delegation of authority from AID/W to the Mission allowed for maximum flexibility in project management. This allowed reprogramming of funds, within the project's original goals and objectives, for optimal accomplishment. (Lazar, 1993, p. 4)²³
- One approach used in this Program which seems particularly appropriate for broader application elsewhere in other disasters and other countries is

decentralized implementation... In general, the sectoral agencies were outperformed by the decentralized agencies. Management of the decentralized agencies was closer to the damaged infrastructure and the affected people and to the firms, workers and equipment engaged in the reconstruction effort. (Checchi and Company, 1987, p. 3.)²⁴

- An “arms-length” strategy [for USAID management of PVOs] was appropriate and successful, particularly in those instances where the PVOs were familiar with AID grant procedures and the parameters for the utilization of USG grant funding. Where the local affiliates less familiar with and less knowledgeable about AID grant requirements, this strategy confronted difficulties (Maged, Neu, Clennon, and Robinson, 1986, p. 21).²⁵
- It is highly desirable to work with partners with specific country presence and knowledge of the activity to be undertaken. Existing contracting mechanisms can be used to provide additional funding expeditiously. However even such NGOs and contractors required a month or more to fully mobilize after the agreement was signed. (USAID Guatemala, 2002, p.5; USAID Haiti, 2002, p. 24). In a rapid response program it can be risky to have partners working in a technical area unfamiliar to them. (USAID Guatemala, 2002, p. 5)²⁶

3.1.3 Procurement and Contracting

- Take early action to develop an effective procurement system. (USAID Jamaica, 1989, p. 7)²⁷
- An emergency situation may persist during the so-called recovery period requiring a continued high degree of flexibility in contracting and commodity procurement. (Checchi and Company, 1984, p. 13).²⁸
- A variety of mechanisms can be used. In addition to standard contractual arrangements, innovative contractual approaches may also be helpful. The Guatemala mission employed Fixed Amount Reimbursable (FAR) contracts for the implementation of construction projects worked very efficiently. (USAID Guatemala, 2002, p. 3); USAID Haiti found the umbrella mechanism to be a very useful implementation mechanism, considering the short timeframe and the many small activities to be implemented in multiple locations. Having one main grantee with several subs created a ready network that eased communications and established a “chain of command” that facilitated progress reporting and accountability (USAID Haiti, 2002, p. 23; SECID, 2002 p. 8).²⁹
- Procurement by Private Sector: USAID and others should provide a letter of credit for local importers. (USAID Jamaica, 1989, p. 8)³⁰
- To improve commodity procurement: (USAID Jamaica, 1992, pps. 12-13)³¹
 1. Hire a custom broker to clear all project goods;

2. Get faxed copies of invoices certified by USAID;
3. Make pre-clearance arrangements at top Mission/Ministry level;
4. Use a procurement coordinator through the life of the project;
5. Hire an additional person to assist the USAID procurement officer;
6. Contract with more than one procurement service agent;
7. Set criteria for the types of commodities that should be procured;
8. Contract with one shipping company to cut down on the build-up storage cost;
9. Use airfreight instead of sea, where possible, because clearance is faster.

- Early Deadline: It is important to set an early initial deadline for project completion, so activities can be reexamined and funds reallocated as necessary. (USAID Jamaica, 1989, p. 6)³²

3.1.4 Reporting, Monitoring, and Evaluation

- The need to provide quarterly and financial reports on the two tranches of allocated funds seemed to be excessive and a poor use of human, financial, and time resources (Development Associates, Inc., 2002, p. 37).³³
- Project management style was important. The constant “on-the-ground” review of project process, together with the use of Monitoring Committees, kept management abreast of progress and problems and enabled them to solve problems before they became serious and caused major implementation delays. (Lazar, 1993, p. 4)³⁴
- It is worth considering the use of an independent organization to conduct monitoring and evaluation. Monitoring and evaluation of disaster assistance programs is typically done by the implementing organizations, who may not have the personnel for evaluations and may treat it as an afterthought (SECID, 2002).³⁵
- Transparency and accountability are major issues in providing assistance to many countries. Accounting for Hurricane Mitch funds was a major concern of Congress and USAID and the recipient countries given the history of misuse of foreign assistance and public funds by governments in the region, with the large scale construction efforts providing ample opportunity for misuse of funds. This was a key topic at the pledging conference for Hurricane Mitch held in Stockholm. Various methods were adopted to increase transparency and accountability. The Roads Program in Nicaragua implemented by CARE reached 17 municipalities and 14,000 families. Before beginning the work, CARE signed agreements with each collaborator in which roles and responsibilities were defined and agreed upon. For example, one responsibility of the communities was to guard the donated tools and materials. The communities were financially responsible for losses (Horn, 2001, pps. 6-9).³⁶

- USAID made particular efforts to strengthen auditing procedures, including additional funding for the Office of the Inspector General, a risk assessment of planned activities with greater attention to those considered high risk, auditing of government expenditures by a major accounting firm, as well as standard USAID financial controls. This auditing emphasis was viewed as very beneficial. Only minor problems were uncovered and those involved believed that this was due to the weight given to correct fiscal management, though there was concern by some that too much emphasis was given to these measures (Horn, 2001, pps. 9-10).³⁷
- The consultant's review of accountability and transparency in Mitch reconstruction activities made three recommendations:
 1. *Develop guiding principles to govern the reconstruction process.* These should be discussed in detail to ensure a common language and shared expectations. By including transparency and accountability within these guiding principles, they become legitimate goals to fund, monitor and expect results, and should play a key role in implementation.
 2. *Provide access to information.* Access to information is the core of a transparent reconstruction process in which all interested parties can be held accountable for their contribution. Such access often runs counter to the cultural practices of developing countries and many donors. Donors should begin by leading by example. Disseminate detailed information about what projects are being funded, who is implementing them, the budget, and the expected timeframe. Provide the information directly to the communities affected. Providing timely information on all public investment could be an official condition for receiving aid. Mobilizing citizen involvement in oversight is a critical aspect of accountability but will only be effective if donors make efforts to do this.
 3. *Stress mutual accountability.* It is extremely difficult to effect transformational changes toward accountability and transparency in a country without working with the government. Likewise, the government must learn to work with its citizens and organized civil society. The most fundamental step that can be taken to improve long term accountability is to establish an environment in which everyone is held accountable to each other in the short term. Support projects that rely on coordinated efforts: transparency and mutual accountability will be necessary to complete them and future collaboration will be more likely. Mutual accountability applies to donors as well. They should be held accountable to their financial pledges and should be ready to answer questions about their procurement practices (Horn, 2001, pps.11-13).³⁸
- Concurrent Audit: (a) Important to establish early a reliable tracking/monitoring system which facilitates an audit. (b) A concurrent Regional Inspector General audit is desirable in a high visibility crisis situation so that mid-course corrections can be made as necessary. (USAID Jamaica, 1989, p. 7)³⁹

- Reporting System: Tailor a MIS system to project management needs rather than relying solely on reports intended for other purposes. (USAID Jamaica, 1989, p. 7)⁴⁰

3.2. Collaboration

3.2.1 General

- The economy was restored as quickly as possible through the cooperation of many agencies. The impact of U.S. funding and cooperation between the Ministry of Public Works, the Railroad Institution, aeronautics administration, local contractors, USAID, U.S. Corps of Engineers and U.S. Embassy personnel were outstanding. (USAID Costa Rica, 1993, p. 3)⁴¹
- Community participation is essential for sustainability (USAID El Salvador, 1999, p.6).⁴²
- The Guatemala mission found in Hurricane Mitch reconstruction efforts that the combination of food for work and OFDA support (such as payment for construction materials) people and communities became highly motivated to work to improve their situation. This led to a positive attitude and increased self confidences on the part of people and communities leading to rapid and effective transition from relief efforts to rehabilitation (Smith 1999, p. 11). The Haiti mission found that the generation of community funds using the 3-2-1 formula was an innovative means of ensuring ownership of the activities by the communities and a resource for community based organizations. (Of six days worked by community members, 3 were paid, 2 were unpaid, and one day's pay was deposited into a community fund.) (USAID Haiti, 2002, p.24, Annex A.)⁴³
- Coordination between the key partners is a must. In El Salvador, initial planning with the Ministry of Public Health representatives allowed a smooth and efficient coordination among the different entities and donors helping people affected by Hurricane Mitch (USAID El Salvador, 1999, p.5). Results can be very productive. In Guatemala, the partner coordination committee supported problem solving and high quality technical exchange. For example, CARE/Guatemala was generous and very helpful in sharing all of its water and sanitation know-how with CRS. (USAID Guatemala, 2002, 3, p. 5)⁴⁴
- During emergency response projects, support and follow up to technical and operational exchange among partners has to be provided. Partners' institutional capacity is strengthened through the exchange of knowledge, tools and experience. The Mission's role in facilitating partner coordination during an emergency response is critical. (USAID Guatemala, 2002, p. 3)⁴⁵

3.2.2 Donor

- Success in managing other USG agencies whose agreements originated from Washington was good but could have been better. The fact that their program managers were based in Washington made coordination more difficult. The question of to whom they were responsible and how their programs would be monitored was not clear (USAID Haiti, 2002, p. 24).⁴⁶

3.2.3 National and local government

- In a USAID-funded project where more than one implementing agency of the host government is involved, and when that results in the involvement of one or more line ministries, the strong linkages within ministries must be quickly recognized and established for the benefit of the Project. Otherwise, higher levels of authority will not be aware of implementation bottlenecks which can not be resolved by technical personnel executing the project (Crowe and Jeffers, 1987a, p. 27).⁴⁷

3.2.4 NGOs/Private Sector

- PVOs will tend to concentrate on target areas where they are known or have links to the community. While this can serve to enhance the likelihood or project success, it can also negatively influence project selection and reduce the chances for broader distribution of project benefits (Maged, Neu, Clennon, and Robinson, 1986, p. 4).⁴⁸

3.3 Transportation and Infrastructure

- The use of local labor in “labor-intensive-public works” in communities that really have shown considerable initiative and concern for the railway is certain to be utilized in future projects. This coupled with the use of appropriate technology can keep down costs and, more importantly, show local communities that they do have some control over their facilities and infrastructure with the resources around them (Development Associates, Inc, 2002, p, 36).⁴⁹
- With a substantial portfolio of infrastructure projects it is desirable to have an engineer to resolve technical issues and improve implementation. (USAID Guatemala, 2002, p. 4)⁵⁰
- The skill sets involved may well require organizational coordination. In Guatemala, the U.S. Army Corps of Engineers identified critical needs and completed timely designs. The Guatemalan Ministry of Agriculture contracted with private construction firms with funding supplied by USAID, while USACE provided construction supervision and final inspection. (USAID Guatemala, 2002, p. 4)⁵¹

3.4 Water and Sanitation

- The most critical aspect that needs to be addressed with regard to water projects is the human element. [Water] tanks are used by people. Without close consultations and involvement with tank recipients as to what is expected from them in terms of taking responsibility for maintaining tanks, the negative public health implications are clear.... Project implementers must pay more attention to training tank owners in total system maintenance [Foundation for the Peoples of the South Pacific, 1986].⁵²
- Water specialists must be included throughout the cycle of emergency water relief activities from design through implementation. (Mason, 1994, p. v)⁵³
- Health benefits to the beneficiaries cannot be expected unless the water provided is potable. Water cannot be assumed to be potable unless construction standards, including environmental hygiene, are defined and followed. Water quality cannot be determined except by analysis. (Mason, 1994, p. v)⁵⁴
- Construction of new water points can provide emergency water supplies. Such construction, if intended as emergency relief, should be designed and managed as such. (Mason, 1994, p. v)⁵⁵
- Community participation can be a highly effective approach in reducing costs and enhancing sustainability of emergency water activities. (Mason, 1994, p. vi)⁵⁶
- When water supplies are contaminated, action to restore them must begin as soon as possible, and the equipment and procedures must be adequate to the task, which can be challenging. In Guatemala, for example, the mission found that well cleaning required sump pumps powered by a large gasoline generator, requiring a three man team. (USAID Guatemala, 2002, p. 6)⁵⁷
- Water purification through chlorination can be a challenge. In Guatemala getting the right levels of chlorine in water to ensure potability “was a challenge never fully overcome.” Sustainability of chlorination was also a concern. (USAID Guatemala, 2002, p. 6)⁵⁸
- Water quality needs to be closely monitored in emergency response projects. Having an independent agency do this is a possibility. (USAID Guatemala, 2002, p. 5)⁵⁹
- Hand dug wells should be improved with protecting walls and sanitary seals. In the case of future flooding, well cleaning activities would be easier since improved wells would not become blocked with debris and mud. Moreover the water quality from improved wells is better. (USAID Guatemala, 2002, p. 6)⁶⁰

3.5 Health

- In light of all the other needs, mental health interventions were not adequate overall. (Smith, 1999, p. 2).⁶¹

3.6 Housing

- Temporary housing was properly excluded from the program. Affected families were successful in working out their own temporary arrangements. The housing repair credit was well conceived and implemented. To the extent that new housing be included in an emergency reconstruction program, proven technologies and implementing agencies should be favored. New housing projects were less successful where rushed in development and/or implementation (Checchi and Company, 1987, p.4)⁶²
- Credit programs for housing construction have a multiplier effect on the amount of investment in housing from savings. Because most of the repair work exceeded the amount of the loan provided, the [Tunisia] program generated a process of self-financing which led beneficiaries to invest three times the amount of the loans received in the construction of their housing (Zerelli and Gafsi, 1988, pps. 2-4).⁶³
- PVOs, through their local contacts, constituency support networks and familiarity with the affected areas, were able to solve operational problems involving land site acquisition, local building permit authorization, and utility connections necessary for the implementation of this program (Maged, Neu, Clennon, and Robinson, 1986, p. 3).⁶⁴
- Where projects involve the construction of shelters for the homeless, prior to occupancy, PVOS should clearly define and/or enforce the tenure of “temporary” occupancy as well as the rental and utility fee arrangements with the tenants and municipalities (Maged, Neu, Clennon, and Robinson, 1986, p. 27).⁶⁵
- Development of new housing for the poor after a major disaster is not easy. Land previously used for housing may be deemed unsafe; finding acceptable new land and paying for it can be difficult. New housing should have greater resistance to serious natural events, but cost of improved housing, ability to pay and who will contribute are factor limiting improvements. Shortages of materials, tools and skilled workpersons can also be important. Repair of damaged housing faces similar concerns. (Smith, 1999, pps. 5-8).⁶⁶
- Due to such factors, replenishment of the housing stock can be delayed and temporary housing risks becoming permanent. (Smith, 1999, pps. 5-8).⁶⁷
- School repair or reconstruction is typically necessary and it is important to reconstruct them with techniques that will make them less vulnerable to natural disaster (USAID Haiti, 2002, p.11).⁶⁸

3.7 Agriculture

- Provide major agricultural support immediately; especially with seeds for planting and the rebuilding of the agricultural infrastructure (Smith, 1999, p. 2).⁶⁹
- A key cause of vulnerability to disaster is poverty. In rural regions, restoring agricultural production may provide an opportunity to increase production as well. USAID Haiti made increasing agricultural production one of five key intermediate results of its program, including production and distribution of improved seeds, and improved capacity to produce those seeds. USAID hoped to achieve an increase in new seed usage from 1 percent to 19 percent. This was not accomplished in the first year of the program, due to need for better promotion/demand creation and new seed distribution, but was achieved in the year following as the result of an expanded promotion program. (USAID Haiti, 2002, p. 9).⁷⁰
- During the post-emergency recovery period, a cash transfer program is an efficient and cost-effective way to assist affected people in a short amount of time. The program helped stabilize the affected households by providing them with income lost during the floods and positively empowered households to rebuild their own futures.... The fundamental principle of a cash grant program – that without any conditions attached, households would make prudent use of the money – was confirmed. The view that women manage the money and choose the family priorities was also borne out. (Abt Associates, 2002, pps. 9 and 46.)⁷¹
- The technical packages for agricultural development – for example use of vetiver grass for stabilization and the selection of suitable crops for risk-spreading – are replicable in other geographic areas (Development Associates, Inc, 2002, p. 37).⁷²

4. DISASTER PREPAREDNESS AND MITIGATION

- The development of cyclone preparedness plans has provided a unique and participatory process that encourages ownership and forward planning in local communities. (Development Associates, Inc, 2002, p. 36.)⁷³
- Linkages in communication should be strengthened between the scientific organizations responsible for monitoring volcanoes and the Civil Defense authorities. (Hammelton, 1993, p. 14)⁷⁴
- One or two persons should receive long-term training with the goal of obtaining a masters degree in geology with a specialization in volcanology or seismography. Short-term training should be provided to about two persons per country. Fields other than geology should be considered such as electronics and computer technology because these skills are also required in monitoring institutions. (Hammelton, 1993, pps. 14-15)⁷⁵
- In order to maintain sustainability, volcano monitoring equipment must be properly maintained by host government. (Hammelton, 1993, p. 15)⁷⁶

- Publication of risk maps should be considered for volcano and earthquake hazards. (Hammelton, 1993, p.15)⁷⁷
- Post disaster mitigation efforts provide an excellent opportunity for beginning a process, but most mitigation efforts are longer term and there needs to be some assurance of long-term support for the activities being undertaken. (Lippe, 1999).⁷⁸
- Disaster preparedness and mitigation require a variety of activities. For example, the Caribbean Disaster Mitigation Project undertook activities in a variety of areas including:
 1. Developing and implementing national and regional mitigation plans
 2. Reducing vulnerability of basic infrastructure and critical public facilities
 3. Improving building codes and encouraging retrofits to reduce natural hazard vulnerability
 4. Increasing availability and access to natural hazard/disaster risk information for use by public and private sector developers, investors and insurers
 5. Increasing community awareness of and involvement in disaster preparedness and mitigation measures
 6. Improving ability of public sector and private property insurers to link premium structure to risk incorporating mitigation activities in post-disaster reconstruction/recovery (Lippe, 1999).⁷⁹
- The Caribbean Disaster Mitigation evaluation found that the activities that worked best were training, information sharing, mitigation planning and community preparedness (Lippe 1999, p. 7⁸⁰).
- The private sector can be a valuable part of the solution to disaster mitigation issues, but would be more effective if it is supported by and operates within a framework established by the government that actively promotes mitigation programs (Lippe, 1999, pps. 5-6)⁸¹.
- There is a need to supplement the activities of central governments, which are generally strapped for resources The private sector, such as the tourism sector or the property insurance sector, is one source. Multilateral development banks can be an outside source of funding for mitigation efforts (Lippe, 1999, 5-6).⁸²
- USAID should place less emphasis on technical tools such as hazard mapping and the TAOS storm surge model which should only be undertaken as part of efforts in which a government has committed itself to broad changes in its approach and is willing to put in the resources to see these changes through (Glaeser, 1992, p. iv; Lippe, 1999, pps. 7, 10).⁸³
- Changing the culture of the way building construction is carried out in countries is worthy of pursuit. As part of an overall effort, that should include training of artisans at the local level, support for building code modifications, and effective

enforcement programs. Isolated efforts are unlikely to have significant impact because of the relationship between all elements in the building process (Lippe, 1999, p. 7).⁸⁴

- Sector specific hazard vulnerability assessments play an important role (e.g. tourism in Jamaica, electrical energy in the Dominican Republic). These appear to facilitate the concentrated attention of decision makers and may be the best means of insuring the enactment of mitigation measures (Glaeser, 1992, p. iv).⁸⁵

ENDNOTES:

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⁴ Crowe, Carlos and Bill Jeffers, Evaluation Summary – Final Evaluation: Rural Reconstruction Project, USAID/Swaziland, December 1987, PD-AA Y-854.

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¹⁰ Checchi and Company, Management Assessment of the Andean Disaster Relief Activities: Final Report, November 28, 1984, PN-AAR-621.

¹¹ USAID Mission to Jamaica. April 1989. "Project Assistance Completion Report: Emergency Rehabilitation Project (532-0185)." (PD-ABA-941)

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