A MODEL PROGRAM FOR REDUCING HOUSING VULNERABILITY

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Pacific Islands Development Program
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INTRODUCTION

The South Pacific island countries lie in one of the most active hurricane regions of the world. In recent years hurricanes have caused extensive losses in Fiji, Tonga, Tuvalu and Vanuatu. Losses from these storms have been significant not only because of loss of life and injury, but also because of the cost of replacing damaged buildings. As these countries modernize, the investment in housing increases and the corresponding losses from hurricanes become greater.

Disasters compete with development activities for money. A country that sustains a heavy loss in housing must often postpone other economic development activities. The cost of replacing damaged buildings is one of the greatest expenses in recovering from a hurricane. Housing reconstruction can also further increase balance of trade problems because much of the material used in replacement construction must be imported.

In recent years there has been much research on simple and low-cost measures to improve the performance of buildings in hurricanes. These measures can be taught to local contractors and to persons building their own homes. They require little added investment, and many of the building losses experienced in hurricanes could then be prevented. To do this, a comprehensive program of housing vulnerability reduction must be carried out by the island governments. These programs would initiate activities to inform the public about the measures that could be taken and would demonstrate the techniques through a series of workshops for local builders and contractors and construction of model homes.
The following is a model program for developing a housing improvement program in a disaster-prone South Pacific country, which is based on several fundamental assumptions:

--- That there are only three distinct situations in which an opportunity exists to change the housing stock: rapid urbanization; development of new settlements in rural areas; and post-disaster situations wherein large numbers of the housing stock have been depleted.

--- That housing changes and improvements will be slow and will require a substantial commitment in terms of time and money to effect.

--- That housing improvements must be introduced gradually, except in a post-disaster situation, and that the basic housing unit must appear substantially the same as the house which it replaces.

--- That the residents of houses vulnerable to a disaster perceive their risk and place a priority on rectifying it.

--- That all housing programs must be carried out in the broader context of the development of the society.

--- That the incidence of destruction can be substantially reduced by adequate pre-disaster planning.
A. Conduct a Vulnerability Analysis.

The first step is to determine which geographic areas have the greatest potential for disaster. This requires establishing a survey team of experts trained in identifying those areas. This team should be made up of an engineer who will analyze the structural characteristics of building materials and methods of construction; an architect who analyzes the suitability of the design of the structures for cultural and functional factors, and the process a family uses to obtain their house; a meteorologist who can interpret weather patterns, or a geologist/seismologist who can identify earthquake zones or volcanic risk.

B. Identify High Risk Areas.

To determine which areas have the greatest potential for disaster, first examine the disaster history of a particular country. Old records of past disasters should be sought; and disasters should be plotted on a large map showing the types and frequencies of the disasters, noting any patterns that emerge.

In the case of earthquakes, geological assessment of faulting patterns and recent ground-breaking activity is also required. Analysis of soil conditions will identify areas of greatest risk of damage during seismic activity.

In the case of flooding, land-use studies along flood plains and in the upper reaches of a stream are necessary to determine the flood risk, both present and future. Identify areas of deforestation in important watershed areas.
C. **Identify Vulnerable Communities.**

Determining geographic areas where a hurricane, earthquake, flood, landslide, tsunami, etc., may strike does not necessarily indicate where a disaster may occur. These natural phenomena only become disasters when they kill or injure people and destroy property. The next step, then, is to identify communities that are located in the zones of risk. These are the communities that are vulnerable to disaster.

D. **Identify Vulnerable Structures.**

Within the vulnerable community, both structural and site analyses must be made to determine which houses may be subjected to damage or destruction in a disaster.

1. **Structural Analysis of Existing Housing Types:** Certain types of structure are more susceptible to damage than others, and structures which are vulnerable in one type of disaster may be ideal for resisting another. For example, heavy concrete block structures are susceptible to destruction in strong earthquakes; yet if well-constructed, they can withstand high winds. Structural analysis should include:

   a. an historical study of each building types' performance in past disasters;

   b. a study of the quality of the materials used in building a typical structure (it should be remembered that most houses fail not because of the quality of the materials, but because of the way they are used.);

   c. an examination of the quality of workmanship typically
used in building a house (the performance of many structures could be enhanced by simple, improved masonry or carpentry techniques.);

d. a determination of features of traditional houses which might cause excessive loading in earthquakes or wind-storms (e.g., the way rooms are added to a house may cause undue stress on interior walls, or may change the center of gravity. Porches and large roof overhangs are particular problems to note in high wind areas.);

e. an examination of the suitability of a structure to its environment. (With the increased mobility of populations today, housing skills and techniques are often brought to one area from another which is climatically different. For instance, poured concrete or concrete block technology may be suitable for a temperate climate but less suitable for a hot, humid climate unless carefully designed for proper siting and ventilation.).

2. Site Analysis: In determining vulnerability, it is of the utmost importance to ensure that the site (i.e., the land on which the house or settlement is built) is safe. Steep hillsides with unstable slopes, areas that have eroded, flood plains, etc., are all poor sites; and it will do little good to improve the housing stock in an area where it will be washed away in a flood.

E. Determine Housing Demand.

In order to introduce change in housing, there must be a demand for new housing. People simply will not give up an existing
structure that is already built and paid for just to move into a new house offering better protection against a disaster which may or may not come during their lifetime. This cannot be emphasized too often: a housing program that is attempted in an area where there is no demand for housing is doomed to fail even before it begins.

Indicators of housing demand include:

1. rapid urbanization;

2. stable rural areas with strong agricultural economies;

3. a high percentage of young people, especially those between the ages of 18-30;

4. areas with a recent history of disasters or high disaster frequency.

F. Determine Receptivity to New Ideas.

There must be receptivity on the part of the target population in order to introduce new ideas. It is often very difficult to gauge receptivity, as most people are very polite and will encourage outsiders to try new things within the community. However, traditions are always strong and there may be a great deal of skepticism about whether a new idea will work. Thus, it is imperative that an accurate assessment of the potential for introducing a new technology be made. Some indicators of receptivity are:

1. other evidence of "modernization" such as dress (do people still dress in traditional clothes, or are newer fabrics and styles prevalent?); household belongings; degree of
2. degree of contact with other communities;

3. past experience of other organizations attempting to introduce change in the area.

G. **Conduct a Sociological Profile of the Community.**

At this point in the process, a number of possible communities have been identified, and the process of selecting the actual community for the first pilot project begins. Sociologists and/or anthropologists should prepare a socio-economic profile of the community, including the following three vital factors:

1. **Determination of the coping mechanisms:** In each society, a variety of internal coping mechanisms exist which serve to help individuals and families through difficult periods, often providing vehicles for collective response both in disasters and also in normal life situations. Identification of these coping mechanisms, and determination of how to relate outside assistance to these built-in systems, are of the highest priority in understanding a community and how it functions. All outside assistance must be provided in such a way as to encourage a collective response utilizing these mechanisms.

2. **Determination of the social and cultural obstacles to the success of the program:** The vast majority of housing programs fail because the obstacles to success have not been identified in the planning phase. Thus, no provision is made in the project to try to overcome these obstacles.
3. **Determination of the target group:** In housing programs, much effort is wasted in trying to convince people who are not essential to the construction process that changes should be made. Much time and effort can be saved by identifying the key actors in the process — the decision-makers — and the incentives that are necessary to encourage the key actors to accept the new technology. For instance, if carpenters or masons normally build the houses in the community, then they should be the target group for much of the housing education effort. If they believe in the changes, then they will be able to encourage those for whom they will build to accept the new ideas.

H. **Select a Community/Site.**

Once the information about the context and constraints on a project is understood, a specific community can be chosen. In the final site selection process, two factors are primary:

1. determining the community's desire to participate;

2. determining a local group through/with which to work.

These activities fall into the realm of community organization. These decisions are often taken for granted by agencies, and it may be very difficult to determine the real desire of a community to participate in such a program. Failure to devote sufficient time to these two functions, however, invites further problems which develop at later stages of the project.

I. **Study the Normal Building Process.**

Each society has its own normal process for the building of housing. Any improvements to the housing must be based on a
clear understanding of that process. Contributions must be compatible with local resources and technical capabilities. Factors which must be understood in the normal building process include:

1. Who participates? For example, who builds the houses? Who participates in the actual construction? Who makes the decisions and at what time?

2. What skills are available? For example, what skills exist in the building vernacular: basic, intermediate or advanced? Carpentry or masonry skills?

3. Are all the required materials available? If so, are they available during any time of the year? Are they of satisfactory quality?

4. How are houses normally financed? Who participates and what are the financial arrangements?

5. Is there a normal building season during which construction should be scheduled? In every society, there is a certain period when excess time, capital and materials are all available concurrently. Timing is one of the most important factors in planning a housing program; houses cannot be built unless it is the right time.

6. What is the comprehension level of the target group? Considerations that must be taken into account include:

   a. the ability to understand the new concepts;

   b. the ability to understand the training aids being used;
c. the number of new concepts that can be accepted and understood at one time by persons in that society;

d. the number of times it is necessary to repeat an operation in order for the average person in the target group to comprehend it.

J. **Implement a Housing Vulnerability Reduction Program.**

The initial step in planning a housing vulnerability reduction program is the establishment of a **work plan**. This describes the policies of the program, establishes the goals and objectives, and selects the strategies and approaches by which the objectives will be attained.

This plan, of course, can only be carried out within the constraints of the available resources. A **budget** must be prepared that allocates funds for staff, office operations, training materials, construction materials, tools, vehicle use and maintenance, etc.

The staff needs to be hired and trained. They include:

1. **An architect/engineer** to develop the construction techniques and details that will be modified for the improvements.

2. **An artist/media specialist** to prepare the training materials and develop the appropriate visual aids.

3. **A construction instructor**, a person with not only construction skills but also the ability to teach the new techniques.
4. Community representatives to help organize the community and provide liaison to the principal audience.

K. Develop the Training Aids and Promotional Materials.

Once an understanding is gained of the normal building process and the comprehension level of the target group, it is possible to begin development of the training aids and promotional materials for the program. The first step in this activity is to obtain a variety of visual aids and to conduct a brief field test to determine whether people understand the message that the aids attempt to illustrate. In some societies, printed materials work well. In others, motion pictures or filmstrips are more successful. In still others, it is necessary to use a broad combination of materials, each reinforcing the others, to get the idea across. The best way of demonstrating something, of course, is to show the actual, finished product. But simple training aids can be effective if they are properly developed.

It is equally important to devote attention to the development of promotional materials that will encourage the population to accept the new ideas. One of the greatest weaknesses in recent housing education programs has been the failure to promote acceptance of the new housing ideas within the general population. It was mentioned earlier that a target population should be identified, and that efforts should be made to encourage that group to adopt the new ideas. Yet this does not mean that the population at large should not be encouraged to accept the new techniques. It is necessary to create a demand for the new techniques, although not necessarily an awareness of all the precise or technical reasons why these innovations are better.
L. **Conduct a Pilot Project.**

When the above steps have been completed (including preparation of training aids and promotional materials), and when the materials are ready and an appropriate time to build arrives, it is time to start the pilot project. There are seven basic steps involved:

1. **Select the recipients:** Working through the community representatives, select recipients for the housing units. There are two considerations at this point. First, it is necessary to build more than one unit (the more you build, the better). If only one unit is constructed, and if the occupants perceive the house as being radically different, they will feel that they are "different"; and so the house will be unpopular from the beginning. In essence, there is safety in numbers. Second, note that houses should be provided to people who will occupy them, not rent them to others.

2. **Select the work group:** Again working through the community representatives, select the people who will be building the structure. These are the people with whom you want to leave the new skills.

3. **Train the team:** Training should take as much time as is necessary; one class in "how to build a house" is usually not sufficient. Ideally, this process should be part of the promotional activities, which culminate in a greater understanding on the part of all the participants. The key members are then singled out and given additional training before actual construction begins.
4. **Build the units:** There are several things to watch for during construction. First, do not do anything that is not in accord with the normal building process; i.e., do not do something that would normally not be done. Use the same supervisory chain of command as is normally used. Use the same work schedule, the same tools, and as many of the existing techniques as possible. When you reach a stage in the construction where a new technique is to be incorporated, sandwich it between operations or steps that are normally part of the process. Be sure to pay attention to details as the house goes up. It will be very damaging to the program if the first few attempts at introducing the new technology are poorly handled because representatives of the project have not planned precisely for the introduction of the new methods or techniques.

5. **Inaugurate the house:** If the owner agrees, a party should be held to commemorate the completion of each house. At this party, neighbors are invited to see the house and to examine the innovations that have been incorporated. (In some societies, such an inauguration would not be proper; therefore, this activity should only be undertaken if the owner agrees.)

6. **Furnish the house:** Once construction is completed, the furnishings and fixtures should be moved in as quickly as possible, so that people understand that it is a house and not just a shell. The more comfortable a house looks, the more acceptable it will be.

7. **Evaluate and revise:** While this is listed as the final step in the project, it is, of course, an activity which should be ongoing throughout the process. As each of the model houses is completed, all the participants should stop
and conduct a thorough self-evaluation of the project. Most important, it is vital to get the reactions of the occupants first; for if you have not satisfied their needs, then the program will require substantial revision.

It is crucial to the success of the program that the public be made aware of the activities. News coverage should be sought so that interest is created and more people will participate.

A central objective of a demonstration program is to promote increased use of improved construction techniques. Incentives may be needed to stimulate individual homeowners to choose to modify their homes. A number of incentives can be used; for example, no-cost or low-cost technical construction supervision could be provided to homeowners. A supervisor would identify specific construction details that need improvement and oversee that they are properly executed. Another incentive could be to provide some of the construction materials needed for the improvements at a subsidized price.

Where appropriate, the government might provide an incentive in the form of a tax credit for homeowners who have made improvements. Or a home insurance policy could be given to homeowners insuring them against a loss from a disaster.
COMMON PROBLEMS IN HOUSING IMPROVEMENT PROGRAMS

A number of common problems have been noted in examining past experience with housing education and improvement programs. They include:

A. Failure to select an area where there is a real demand for new housing.

B. Failure to conduct the project in an area where new ideas are more readily accepted.

C. Failure to work through existing social and economic institutions relating to housing.

D. Failure to determine the cultural and social constraints/obstacles for a housing project of this type.

E. Failure to provide housing improvements at a price which homeowners can afford.

F. Failure to understand the normal building process.

G. Failure to understand the importance of timing in construction activities.

H. Failure to accurately determine the comprehension level of the target group.

I. Relying too much on the use of training aids as opposed to actual model structures.

J. Construction of buildings other than houses, to serve as model houses (e.g., schools, community meeting halls, offices,
warehouses, etc. As far as local people are concerned, a house is not a house until it is occupied. Housing units that are built but not furnished also pose an identity problem.)

K. Failure to use local builders.

L. Use of architects or engineers to develop designs and to supervise construction. (If people see architects or engineers designing each model house and going through the steps that are normally conducted for building a house in an industrialized society, they will become convinced that the technology being advocated is either beyond their comprehension or beyond their ability to afford.)

M. Taking short-cuts. (Often, in an attempt to speed construction, certain short-cuts are taken — for example, the use of machine tools to replace hand labor; the importation of materials that are not indigenous to the area or are not in season; and/or the use of components that would not normally be used in building a house in the target community.)

N. Building out of the normal building season.

O. Failure to provide enough space in the model houses. (Acceptability of new housing styles is often predicated more upon the amount of living space than on any other single factor.)

P. Failure to follow up and thoroughly evaluate the housing program.