# SEISMIC AWARENESS TRAINING THROUGH DEMONSTRATION PROJECT

**Satyendra P GUPTA**[1]


## SUMMARY

Several developing countries suffer from earthquake and other disasters.Asia and the Pacific region is no exception and during any major disastershave high economic losses. The general awareness of disasters and preparedness in Asian countries is poor. An innovative approach to impart education and training to the community faced with disasters was conceptualized and implemented. This paper deals with the approach used and achievements.


## INTRODUCTION

Statistics indicate that the region of Asia-Pacific faces more natural disasters in number than any other regions of the world. These disasters affect seriously the habitation of rural masses as they are generally built non-engineered. It is mainly due to socio-economic considerations and lack of technical know how. The Philippines rural areas with vast majority of non-engineered constructions faces 20-22 cyclones every year with 5 to 6 very damaging ones. The losses used to drain out the scarce resources of the country which otherwise could have been used for some other developmental works. The government could not afford to rebuild the destroyed houses of all victims, thus only token help could be given. Most available government allocations and other donated international contributions went into emergency relief and other bare necessities. This philosophy was never helpful and situation remained the same. This author had an opportunity to see the destruction and assess losses. A new idea was conceived and a program was prepared. This package Gupta (1993) not only helped the disaster affected community in their safe rehabilitation but in the process it imparted disaster related education and training. The general awareness about hazards have increased, the community is better prepared to cope with the future disasters and neighborhood associations are continuing the efforts initiated.

The philosophy for this particular work in this situation was very simple. It was planned to develop a disaster resistance structure for safe rehabilitation of the victims which will not be destroyed. The cost was affordable and within the budget provided by the government. The design was familiar to people and they were used to constructing them normally. The additional feature introduced was only the disaster resistance capability within the cost. This program is working well and structures are behaving excellently for last 8-9 years now. The author wanted that such programs should be tried on a pilot basis in Asia-Pacific countries which suffers regularly. This idea got a real support when the Philippine Government made a declaration that it is ready to help any country that wanted its help in this kind of efforts ( this declaration was made by Mrs. Corazon Aquino, President of the Philippines while inaugurating a conference of ASEAN Ministers). The time passed by and many disasters hit countries after countries. The author again had chance to visit some countries to see the devastation and got convinced that there is a definite need to initiate some pilot program based on the very idea. Thus a new

[1] *Civil Engineering Group, Birla Institute of Technology & Science, Pilani, 333 031, India*

regional program to impart education and training related to disasters with the help of demonstration project was formulated. It took some years to obtain funding for this work. This paper will now describe one such training and awareness program for earthquake utilizing demonstration project.

## CONCEPT OF THE PROGRAM:

This program aims to transfer the technology of disaster (Earthquake or Cyclone) resistant construction appropriate to the community. If a community live in a disaster prone area, they will face its fury some day. Its severity will depend on the characteristics of the hazard. If the community's structures and other public facilities are safe then they do not have to worry much with the effects of disasters. The authorities then can concentrate their efforts on other activities. But in developing countries facing the disaster and taking care later on has become a perennial problem. So the program was thought to be timely. In order to finalize an area for project establishment some simple criteria Gupta (1997) was developed. The selected site for implementation of project must be in a highly disaster prone area of the country. Further it must have faced some disasters recently. Based on these criteria the following countries were selected: (a) Nepal- dealing with earthquakes; (b) Indonesia- dealing with earthquakes; (c) South Pacific Countries –dealing with cyclones; The main focus of this work will be on Education with Preparedness, Prevention and Mitigation (PPM) for earthquakes and cyclones.

## PROGRAM ESTABLISHMENT

A powerful earthquake hit the eastern region of Nepal in 1988. UNDRO now DHA-Geneva sent the author to prepare a report on earthquake and mitigation majors to be taken. When the author was visiting the damaged area in Biratnagar, the World Bank team was also collecting data on rehabilitation and reconstruction packages. Their basic interest was to provide funds to the government in its rehabilitation efforts with an aim to recover their loan money. The World Bank team for a discussion invited author and the package was discussed. The package did not contain any specific recommendations regarding preparedness and mitigation measure. The money will be simply handed over to the victims. Author felt that such approach is not very useful in improving the situation of the people and it has never worked citing examples from several countries and further suggested that education and training component at the local level should be included in the bank's assistance package. It was felt that to help the victims in their rehabilitation efforts technical assistance in an organized and sustained manner should be provided. It has been learnt that this project of the World Bank did not provide direct help to the communities in preparedness for earthquake. For five years in the absence of resources author could not pursue his original ideas. When the author obtained funds a contact with His Majesty Government of Nepal, Ministry of Housing and Physical Planning was made.

The ministry's assistance was sought in the execution of this program but unfortunately this did not meet with success and valuable time was lost. Author decided to use his personal influence with other contacts in the country. When his personal acquaintances informed to visit and discuss the program, a visit was made.

After careful considerations a site at Harisidhi Village outside Kathmandu was selected for implementation of this pilot project. Sites very far away in Nepal would have been difficult to reach easily. Availability of materials, training and documentation facilities etc. helped its selection. Further this site has also faced the fury of 1934 big earthquake in which most of the Kathmandu valley was destroyed and in this village no house remained standing. Initial contacts were made with the village development council (VDC). The VDC chairman listened to all our ideas and details and wanted to consult his council members. The full council with members of the community wanted to hear in person on the program before giving their final judgment on its acceptance. When they heard, it generated lot of enthusiasm in them and they wanted to have a village meeting of their own to seek their support. Thus there were several rounds of discussions between the VDC and the author. When VDC was fully satisfied that this project is going to contribute some benefits to the community and they are going to learn something useful then only they accepted the project in their village and promised to participate.

## SELECTION OF THE DEMONSTRATION STRUCTURE

The choice of the structure was left to community with caution that it must be such which they can construct themselves. Further there will be adequate training component in it on how to construct that structure which is earthquake resistance. After its construction it must be used regularly for some good use, then only all purposes would be achieved. It was a challenging task for the community to come up with such a structure within a limited budget. The success and failure of a project depends on the acceptance and participation of the community and their level of involvement in planning and implementation process.

There had been several cases of failure of projects where such participation has not been sought. It was learnt that this village had received a school building as a gift from a French Organization but this structure could not be completed due to shortage of funds. It was a timely warning and should be kept in mind. The village has all other general facilities like schools, clinics etc. The villagers expressed a desire that most of them are engaged in farming, they needed a place for farmer's training. The question remained that if a structure is built only for this purpose, will that be used all year round. The answer was a clear no, hence its utilization decreases. The problem was the optimum utilization of the structure. Finally after few days of consultations, author provided a solution and called the structure a Multi-Purpose Training Facility. The structure when used by the community will not only be providing training on agriculture but on several areas like earthquake preparedness, prevention, mitigation, disaster resistance construction, all kinds of health related training programs for the villagers, crop improvement, environmental protection, fertilizer and pesticides use, employment generation programs, cottage industry, ladies program, adult education, small children related programs, pregnant ladies programs etc..

To plan for different kinds of activities through out the year the structure should have an office room where such advance planning by different interested groups could be made. Further contact should be established with various Govt. dept. and ministries to provide cooperation in implementation of such training programs. The author took the responsibility to discuss these with various ministries and persuade them to cooperate. The VDC was authorized to develop more details of the program in cooperation with villagers when implementation phase begins. The author will in the meantime develop the design and other details of the structure and will send it to VDC for their advise and further incorporation.

## COOPERATION WITH DIFFERENT ORGANIZATIONS

The housing ministry wanted their department, which is directly concerned with this kind of work, be involved at later stage. They were also implementing World Bank project of rehabilitation and reconstruction, so it was a good opportunity to associate them and seek their help too as government partner. The Director General of Dept. of Building personally took interest in this work and deputed an engineer and a junior engineer to be associated in the program from department and to provide all possible help. The UNDP Kathmandu office was regularly briefed about the development and the officer in charge was aware of the progress of the project. At the appropriate time when most of the details were ready then USAID Kathmandu office was informed through a meeting and all available information were provided.

## IMPLEMENTATION OF THE PROJECT

The design, drawings and specifications for the structure after preparation, was sent to the VDC for their input. It was emphasized to consult the community before sending their input for possible incorporation. The useful advises received from the community were duly incorporated in the design work. The community had already identified a plot of land and had prepared the ground for demonstration structure. It was suggested in a meeting that the place for training should be quite near to the demonstration structure so that both classroom learning and work execution can be done simultaneously. As the original idea was to develop a base for long term earthquake

preparedness at the community level in the village, a number of persons from different groups had to be selected who could later take up the responsibility of awareness raising and education.

The following guidelines for selection of participants were set:

- To have a trained cadre of mason, carpenters and technicians in the village community where the project has been demonstrated through education, training and construction.

- To provide the opportunity of this training to other nearby disaster prone villages by including their representatives in this program for creating multiplier effects. To provide education and training to community (villagers) along with the above group with an aim for general capacity building for disaster preparedness, prevention and mitigation and also for technology transfer to masses.

- To provide an opportunity of training to a few engineers and junior engineers of Government of Nepal who will be useful in technology transfer work in future.

One of the main objectives of this program is to study on the acceptability of the program by the community, their participation, the utilization of the knowledge-gained etc. Before the actual implementation of the program, a meeting was held to develop the details of training work and demonstration construction schedule. A very interesting point on the use of language during training was raised. It was pointed out that in this work execution and training, the author will be the main speaker and he can only speak English, Hindi and he understands only little Nepali language. The villagers and all other community people in the area only speak and understand Nepali and Newari language. The engineers deputed by the Govt. of Nepal could speak Nepali but he could not speak Newari very well and this called for a person who could speak English and Newari well. This Govt. of Nepal engineer happened to be a former student of the author and hence it was relatively easy to identify some other person who could help the group in translating the messages into Newari language. Such problems do arise in a work of this kind and people should realize this and solve adequately for effectiveness.

The department of building provided us with some documents on earthquake preparedness and it was a good opportunity to use and test its effectiveness. After examining those documents the author decided to use it with some modifications along with other materials. As the class room space was to be limited and every one desiring to obtain training could not be accommodated, the VDC developed its own guidelines to select people which will represent all communities in the village and all invited guests from near by villages. The author had earlier suggested that woman groups should be adequately represented along with men.. The first group training with over one hundred and twenty persons lasted for three full day period.

## EARTHQUAKE TRAINING

Relevant government agencies, UNDP and USAID-OFDA offices were briefed before the commencement of the training. The Chairman of the VDC inaugurated the training program. He reminded the 1988 earthquake and the damages it had caused to various areas in Kathmandu valley itself. The damages were widely published in various news articles and thus were fresh reminders to the people. People had seen the footage of damages on TV and hence were very curious in the subject. The whole program of the training session was divided on several modules. In the first session simple facts about earthquake and why they should be aware of this problem were told and some VDO on damages were shown. People were surprised to see as what could happen in a matter of seconds. They were absolutely unfamiliar with these damages and could not imagine how one could protect themselves. The session was devoted to awareness raising and remedial measure to prevent the losses.

There were slides showing damages to various types to structures in different countries as well as structure, which were not damaged when adequately, constructed. It created a good understanding in the minds of the people about earthquake, what it can do, and what measures people should take. General preparedness exercise was also demonstrated and practiced. At the end of the day some discussion took place on how to propagate the knowledge gained and on demand additional VDO on preparedness were shown.. It was remarkable to see that ladies were the first to take upon themselves the responsibility to disseminate the knowledge gained on awareness and preparedness in their respective woman organizations. As these ladies came from various groups it will be easy for them to propagate the knowledge to other members. In the village the habitat construction is

done basically by the house owner aided by village artisans. Among the trainees a good number of artisans were invited along with local people. Apart from Earthquake preparedness they must also be trained on the earthquake resistant construction of structure. This work was divided into two parts. First the discussion focused on technology transfer to artisans for new construction. How a village house gets destroyed in an earthquake was explained in simple detail and what are generally weak areas which leads to its destruction. If the people do not want that the house or any other structure should be destroyed then earthquake resistant construction should be done.

In the village there were about three different types of materials (bricks, stones and timber) being used for house construction. The earthquake resistant construction technique using a particular material was explained in detail. Theconstruction of a structure will start from foundation and will be completed all the way up to roofing. During the process the earthquake resistance will have to built in at appropriate level. When earthquake strikes it is these mechanism which have been incorporated will help in resisting the force of earthquake. Although the training style was a class room type work but its execution was a process. The author will provide detailed explanation with the help of sketches, drawings, photos and oral presentation etc. and use English language. This will be translated by a local engineer in Nepali language and by another technical person in Newari language for different language groups. When a small part of explanation for the work was completed, few participants will be called to the podium and will be asked to explain their understanding so far.All participants had been provided with written notes and during training they had been encouraged to take down their own notes. Those capable of taking notes made their own records. While providing explanation they were also advised to refer and use their notes for assistance. If an artisan could not read or write then he was encouraged to explain with his memory only. If the artisan provided a satisfactory description then questions will be asked from the floor to gauge their level of understanding. If the description outlined does not come out to be satisfactory then the same portion of the work is repeated by the author for clear understanding.

The feed back from artisans and teaching in steps continued to cover the complete construction of an earthquake resistant house. Although this process is quite slow in any training but in author's view it is more effective rather than one sided teaching where the lecturer just delivers the talk and participants do not respond. In the beginning the artisans who had reading capability were called,and later to speed up the process few artisans in groups were also called for giving descriptions on the podium. Artisans in the group can discuss among themselves and provide details. In the field in any work generally two or three artisans will always work in a group, so group discussion is desirable for consultation. When it was felt that artisans have a good understanding the lessons then only further lesson was attempted and this way earthquake resistant construction technique using materials as bricks, stones and timber were covered for new construction. On having familiarity with earthquake resistant construction, it was time to introduce to them the new demonstration structure and its salient features. The main features of this structure was explained and artisans were exposed to the drawings of the new structure. All became familiar with the earthquake resistant features which had been incorporated in this demonstration structure and also how this resistance will be achieved during the construction process using the new knowledge just gained during the training. This will not be a regular construction but a learning exercise. The demonstration structure drew lot of discussion as this construction is quite relevant to the community. The people were very eager to know more details on this and enthusiastic to participate in its construction.

Next training agenda was to talk on how to check their own houses for weaknesses and improve its strength. This was another interesting topic for the group. Some useful suggestions were provided to check the conditions of their houses and assess whether it needs any improvement. As different house conditions vary significantly, no generalization can be made but if a particular situation is found then the owner can improve by the techniques suggested. In case the problem is found to be more acute and the house is really in very bad shape, then it is advisable to consult a technician who can examine the condition in detail and suggest appropriate remedial measures. At the end of training session there was a recapitulation session and this part of the training was concluded with a small closing function attended by a local dignitary with distribution of certificates to participants.

## DEMONSTRATION CONSTRUCTION

At the selected site the foundation marking was done after appropriate measurement. The staff of building department aided with community did the work. It is the tradition in the area that whenever a new construction is done, a religious ceremony be held. Many villagers and old people joined the foundation laying ceremony. The major earthquake of 1934 with a magnitude 8.6 was recollected in which this village was devastated and more than 200 people had been killed. It was a shock to the community to listen to this.

When the old people were asked to discuss improvements on the houses since the last big earthquake, their answer was not much has changed, only more stories have been added. The addition of more story makes these houses more vulnerable to earthquakes. The comments of the old people justified the selection of this site and author felt happy that a good beginning has been made. The construction proceeded normally and faced difficulties as usual. It is a normal brick construction, so artisans were familiar with its construction and training received further helped and thus no major difficulties were faced for most work. The junior engineer of the department of building was at hand to provide guidance along with others. Whenever author was in Nepal he himself stood at the site at all times to supervise every small details. The ladies group provided the really needed labor support throughout the project. Other community groups helped in all other construction activities and whenever more manpower was needed. Artisans were generally responsible for learning the new earthquake building construction technology.

The department engineer helped in site training work of artisans and other interested persons when problems were faced. On reaching the plinth level the construction stopped as artisans had difficulty in putting the reinforcing bars (steel) vertically in the walls This is an earthquake resistant measure and a new thing for all. A technique has been developed and following that no wastage of brick takes place. The author took time to explain in detail on how to place steel at various places in the walls by proper cutting of bricks. Artisans practiced it on the ground and the author saw that it is done in the appropriate manner later in the construction. Difficulties were also faced with reinforced concrete lintel work and roof slab work as artisans were not familiar with steel reinforcing details. Such works had to be done very carefully. In village situation there is generally a tendency either to make the work inaccurate and use more steel than needed and thus make the work uneconomical.

These points were explained to the artisans. Technical personnel were instructed to remain watchful in future when dealing with such construction. On the day of roof casting large group of people volunteered to work as they wanted to show their participation, involvement and community spirit and they had to be scheduled properly. All this work of construction and training did not go continuously and were staggered over several months.

When the monsoon season or cultivation time arrived the construction work had to be stopped as no one was available. Similarly awareness and preparedness training work had to be done twice and on site training went on continuously whenever there is construction in progress. The other works like plastering, carpentry and finishing etc. were done normally and they did not needed any major supervision. Thus the education, appropriate technical training and demonstration construction were generally completed as per plan.

## HANDOVER OF THE STRUCTURE TO COMMUNITY

This project was initiated to create an awareness towards earthquake problems and provide preparedness measures to the community. Another goal was to transfer appropriate technology for non-engineered construction suitable to the region. In order that more people get good training and are able to further continue their preparedness, mitigation and technology transfer activities a structure was constructed with the knowledge gained.

Now it was the time to hand over the structure to the appropriate village organization to continue their work and for good upkeep of the structure. As the government organization had only provided support from outside they did not want to take responsibility of the structure but would assist in its future training activities. It was advised that some other organization should take the responsibility and department support will continue. So far the VDC had provided excellent cooperation and mobilized all efforts for this work but their members also changed, will change in future and it was thought that the structure should not be left in the hands of VDC only. Some willing NGO active in disaster prevention works were identified and were requested to join hands. The author had already prepared some guidelines on the future use of the structure in consultation with the community and for continuation of preparedness and technology transfer programs, and they had been given to the VDC. The structure was formally handed over to community through VDC and the NGO group in a simple ceremony.

## ACHIEVEMENTS

Through this pilot project a highly seismic area which had a history of damages and had remained unprepared so far had been transformed into a prepared community. Earthquake awareness have generally increased not only in this community but words have spread from the people who attended the program as representative from other nearby villages. The news papers describes after two years that the earthquake resistance features introduced during training are being used in peoples own construction following the examples of the demonstration work. Another encouraging fact that people expressed satisfaction after training and later submitted requests for establishment of similar program in their community. Woman became more concerned for safety of their own homes and wanted to see their houses safe. A very good comment came from the women group that our homes should be safe enough because we are the one who stay in homes during the day when our husbands are at work or in the field and take care of children, elderly etc. If an earthquake comes and the homes are destroyed, our husband may not see us. This was a touching comment and expressed a genuine concern for safety. Through this project at least this awareness has been created to the community.

Now after four years of project completion the information has come to the author that villagers have started following earthquake resistant construction practices in their new construction and this is a welcome sign. The author feels satisfied that a small beginning which was conceived is bearing fruits in spite of all difficulties faced.

## CONCLUSIONS

Training programs are set up and executed but the effectiveness remains limited as it is confined to a class room type work and exchange of ideas only. There are very few programs which have been developed with demonstration work particularly with earthquake awareness of this type which are rare to find. If a combined demonstration cum training program is set up, its effectiveness increases. Every program developed for people's benefit must have community participation component at every stage in its planning and execution for its success. Community projects rarely sail smoothly and the implementers must have patience and determination to continue up to the end. In this Nepal project the author went to the village as a stranger with the assistance of a friend and gave them a new concept and created an everlasting legacy. The community gained worthwhile knowledge and promised to continue the work. A new experiment with the community had been successful. It is a good concept and developing countries with seismic activities may replicate such projects for the benefit of their people. It is also felt that institutions engaged in development work related with seismic activity may consider instituting such programs in the countries.

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