Documentation of Procedures, Evaluation, and Monitoring Tools

One of the strengths of the MEERP project has been its attention to developing and documenting procedures, monitoring progress, evaluating quality, and ultimately evaluating the satisfaction of beneficiaries. Many of the management tools developed under this project, such as the PMIS, the use of design consultants or contractors to supervise the entire construction process in the relocation villages, the technical audit teams, and the emphasis on evaluation, all represent innovations that the GOM will continue to use in other development projects. Careful documentation exists for basic policy guidelines, tracking of construction progress in relocation and repair and strengthening villages, activities undertaken by the community participation consultants, and evaluation of beneficiaries' and NGOs' participation in the project. Some of these innovations are described below.

Disbursement of Entitlements

Observation

- *The GOM carefully developed procedures for the disbursement of entitlements, both cash and in-kind (building materials). Thus, they were able to more readily track the use of the disbursements to ensure that they were used for reconstruction. After other recent earthquakes in India, government officials disbursed benefits in cash and did not see much reconstruction take place.*

Discussion

Disbursement was a mix of cash and in-kind and was carried out in three installments. The following steps describe the disbursement process for entitlements in repair and strengthening villages, specifically for a moderately damaged house (IAEE Damage Category 1 to 3) (Nikolić-Brzev and Anicic, 1994; LASA, 1998):

1. A Junior Engineer (JE) visits a beneficiary's house. The beneficiary must sign a consent form as a commitment that he/she is going to use the financial assistance provided to carry out the strengthening/reconstruction work as per the GOM specifications. Subsequently, the JE discusses the salient features of the technology packages offered under the RRSP (i.e., repair and strengthening *or* reconstruction). The beneficiary then selects a technology package that fulfills the desired needs. In some cases, the beneficiary requests time to think over the options and to discuss the issues with family members and the community. Once a decision has been made, the JE prepares the construction cost estimate.
2. The JE submits the cost estimate to a deputy engineer to obtain technical approval. The sanction is then forwarded to the office of the Tahsildar, a top revenue officer at a subdistrict level, for the release of the first installment of financial assistance. The first installment is disbursed in cash to the beneficiary's bank account (approximately 20 percent of the entire financial assistance package). The beneficiaries used a portion of the first installment to purchase CGI sheets and to construct temporary shelters. Once the construction was completed, the same CGI sheets could also be used as roofing material.
3. The second installment is disbursed to the beneficiary after the JE certifies that the construction site has been prepared. Again, the sanction is obtained by a deputy engineer and a release of payment is made by a Tahsil office. The second installment is disbursed as a mix of cash and in-kind. The cash portion (equal to approximately 40 percent of the total financial assistance package) is required to cover the expenditures incurred by the beneficiaries for labor and some building materials (that were not available in the material stores). The remaining portion of the second installment (equal to approximately 30 percent of the total financial assistance package) is disbursed to the beneficiaries in-kind. After obtaining coupons for cement and steel, the

Figure 43
Beneficiaries collecting materials from the government depots.

beneficiary collects the necessary building materials from stores established by the PMU (Figure 43).

4. The third installment is disbursed after the construction reaches the lintel level and casting of the concrete lintel band has been completed. The third installment is equal to approximately 10 percent of the entire financial assistance package.

Procurement of Materials

Observation

■ *The GOM established building material depots to handle the heavy demand for building materials and the potential for price gouging and to control distribution to the beneficiaries of the RRSP. The authors of this report believe that this effort was instrumental in facilitating the implementation of construction activities under the* RRSP.

Discussion

The RRSP strategy document (Nikolic´-Brzev and Anicic, 1994) envisioned the beneficiaries taking the initiative in procuring the building materials required for the reconstruction/strengthening of their houses. It was also anticipated that they would make an effort to salvage as many items from their original houses as possible and recycle them in the construction phase. However, considering the scale of the project and the heavy demand for certain building materials used in the construction, such as cement and steel, the GOM decided to establish a network of material depots to ensure a steady supply of the critical building materials. A total of 14 material depots were established in the most affected districts of Latur, Osmanabad, Solapur, and Satara. External consultants appointed by the PMU managed the depots. Over 420,000 tons of cement and 10,000 tons of steel were distributed through the material stores until March 1998 (GOM, 1998c). The beneficiaries procured other building materials, such as clay bricks, sand, aggregate, and CGI sheets, on the local market. Due to the heavy demand, the market rate for bricks doubled from 1994 to 1998.

Evaluation of Construction Quality and Program Outputs

Observation

■ *A full-time quality assurance and technical audit team was appointed as part of this project. Thus, thorough documentation exists on all phases of the project, which will be useful in the final evaluations of the project's effectiveness.*

Discussion

One of the conditions of the World Bank credit was that "an independent full-time quality assurance and technical audit team be established to review the delivery and quality of the program outputs and to assess whether they meet program objectives." The objectives of the Quality Assurance and Technical Audit (QA&TA) consultants were to report and verify:

1. Project outputs/products were consistent with the project objectives.
2. Quality of workmanship and materials for the assets under construction and those completed were acceptable.
3. Satisfactory procedures/tests were in place to ensure that quality objectives were being met.
4. Technical solutions and design options, consistent with program objectives, were in place.
5. Degree of supervision provided was adequate.
6. Beneficiaries were satisfied with the assets created.

A consulting team consisting of 28 full-time engineers and 14 visiting experts worked on the project from November 1995 to June 1998.

Beneficiaries were encouraged to participate in the quality control process. Engineering consultants displayed quality control charts at various locations in the villages in Marathi, the local language, so that beneficiaries were informed and had an opportunity to comment on issues of quality (GOM, 1995).

Some of the most pertinent findings from the consultants' final report, issued in December 1998 (LASA 1998), are as follows.

Relocation Villages

In the relocation villages the scope of work for the QA&TA consultants was to visit each site at least once a month and to review the listed objectives. The consultants also carried out independent tests on the building materials used in the construction. Two points in the QA&TA final report are particularly interesting.

1. The consultants believe that "when the project involves construction of about 30,000 houses against time in a difficult environment where temperatures reach 45° C (113º F), there is acute water shortage for three to four months a year (Figure 44), local sand is coarse with a high silt content, and the experience of the masons is poor but the requirements large, the problem of maintaining quality is an enormous one..." (LASA, 1998). According to the LASA report, a major source of construction quality problems was the extensive use of concrete technology, especially the use of concrete blocks and reinforced concrete slabs. "The conditions prevailing in the project environment were not conducive to strict quality control and adequate curing."

Figure 44 *A case of acute water shortage in a village undergoing in-situ rehabilitation.*

2. The second finding relates to the degree of beneficiary satisfaction with the created assets (houses). According to the report, "…the houses given to the beneficiaries of the relocated villages are of far better specification than the houses in the old villages (repair and strengthening villages). In spite of that, the beneficiaries in the relocated villages were less satisfied than those in the repair and strengthening villages for the following reasons. a.) There were some problems with the quality of construction in the relocation villages. b.) The beneficiaries did not participate in or contribute to the construction of their houses. They had no sense of achievement or pride, and they were often unjustly critical. c.) They were demanding and frequently pampered. Some demanded that their house exteriors be painted with "Snowcem" (a special and expensive protective coating)..." (LASA, 1998).

For further discussion of satisfaction in the relocation villages, see "Evaluation of Beneficiary Satisfaction" below.

Hybrid (Category B) Villages

In a discussion of the Category B, or hybrid villages where beneficiaries participated more directly in the management and construction, the technical audit report (LASA, 1998) commends both the quality of construction work and the degree of beneficiary satisfaction. The NGO-managed construction of houses in Category B villages was successful. The report states that since the beneficiaries in Category B villages did not have very high expectations of the GOM, they were, in fact, satisfied with the assets obtained as a result of MEERP. It is very likely that beneficiary satisfaction was due to the fact that the rebuilding of the Category B villages started in late 1996, or three years after the earthquake. By that time, many beneficiaries had lost hope that the GOM would ever provide them with new houses.

Reconstruction, Repair, and Strengthening Program (RRSP)

Given the scale of the RRSP in the four most affected districts of Latur, Osmanabad, Solapur, and Satara, the QA&TA team's scope included only 10 percent of the houses in each village, visited on a random basis at least once a month. (Approximately 207,000 houses in over 1,500 villages in the Latur, Osmanabad, and Solapur districts were initially included in the program.) On the average, QA&TA consultants visited over 700 villages per month. General findings of the their inspections of the RRSP villages summarized in their final report (LASA, 1998) were as follows:

- Since building materials were procured from a large number of widely scattered sources, it was not possible to ensure the same level of construction quality control as in contractor-constructed villages, i.e. relocation and hybrid (Category B) villages.
- Approximately 80 percent of the houses in the RRSP were constructed using GOM technical specifications, including all earthquake-resistant features.
- Only 0.1 percent of the total number of beneficiaries in the RRSP retrofitted their houses. According to the results of damage assessment, approximately 80 percent of the houses in the four districts were repairable (IAEE Damage Categories 1 to 3).
- Some of the houses constructed in the RRSP had a number of technical defects, including discontinuous bands, especially at the lintel/roof levels (Figure 45); inadequate concrete covers leading to exposed reinforcement bars and chances for the corrosion; CGI sheets that were not attached to the roof by hooks (as required), but instead were held in place by stone boulders; excessively large or inappropriately located openings in the walls.
- With few exceptions, the degree of supervision provided by the PMU engineers working in the villages was adequate.
- The beneficiaries were pleased with the rehabilitated houses. "As they (beneficiaries) had contributed funds and physical effort to construct their houses, they were proud of their achievements. The level of satisfaction of the beneficiaries with the assets created was very high" (LASA, 1998).

Figure 45 *An example of poor construction of a concrete lintel band showing exposed rebars and the change in the level between the two walls.*

Evaluation of Beneficiary Satisfaction

Observation

- *One of the outstanding features of this rebuilding project is the attention paid to evaluating effectiveness, in particular the satisfaction of beneficiaries. The GOM plans to make such evaluations available to researchers around the world.*

Discussion

As discussed above, the quality assurance team addressed beneficiary satisfaction in a number of its reports. In addition, several separate studies were commissioned to address satisfaction and other issues of participation. One such survey was conducted by the Economic and Political Weekly Research Foundation. This extensive study conducted surveys in 33 villages, with a sample of about 2,600 beneficiaries. Some of the major findings indicate differences in satisfaction depending on the type of village and rehabilitation program—relocation, Category B (hybrid), or repair and strengthening in-situ. According to these researchers, the relocation villages (by allotting ready-made houses) dampened initiative and nurtured dependency. Notwithstanding the high level of construction standards in the relocation villages, they reported that the majority of these beneficiaries held the view that the new houses were not safe to live in. In the repair and strengthening villages, the beneficiaries took initiative, participated actively in the construction, and had high levels of confidence in their new houses and the single rooms that were reconstructed.

The GOM is currently working with a contractor and the Center for Studies in Social Science (CSSS) to finalize a major study of all beneficiaries in the relocation villages (a survey of 23,498 beneficiaries) and 5 percent of the beneficiaries in the repair and strengthening villages. The study documents various socioeconomic characteristics for each beneficiary, as well as each person's level of satisfaction with his or her new or repaired house. This larger study of all the relocation village beneficiaries reported high and positive scores for the various features of construction of the new

houses. Sturdiness and earthquake resistance received the highest scores (70 or above), while quality of construction and safety of the house also received high scores. Eighty percent of the households reporting responded that the new house is safer. Of those households, 88 percent said it was because of the use of cement and sand and 64 percent said it was the use of earthquake-resistant technology (multiple answers were allowed).

In general, preliminary findings from the survey of beneficiaries in relocated villages indicate that the overall perception of the rebuilding program was positive, particularly for the design of each new village, amenities in the village, and the nature of construction of each house. The perception was negative for lack of certain civic amenities such as a crematorium, adequacy of water, construction of toilets and employment and income-earning opportunities. In general, CSSS found that respondents are aware of the stronger construction and of the earthquake-resistant technology used. However, because they continue to feel small tremors in this area, most beneficiaries prefer to sleep outside. The survey found that the layout and design of houses, the adequacy of water, better amenities, the work of the NGOs and the people's participation in construction supervision all played an important role in determining the level of satisfaction of the beneficiaries.

In the survey of beneficiaries in the repair and strengthening program, the CSSS found that 95 percent of the respondents reported overall satisfaction with the construction and/or repair work undertaken on their houses. Ninety-three percent believe that the new construction or repairs are earthquake resistant (CSSS, 1998, 12.9).

The data from this survey will be stored on a CD-ROM that will be made available to interested researchers throughout the world. Such a comprehensive survey of beneficiaries will be very useful to policymakers in designing future recovery and rebuilding programs as well as to researchers who want to compare experiences across earthquakes.

Evaluation of Potential to Reduce Future Loss

Observation

- *The GOM made intense efforts to provide education on earthquake-resistant construction. The authors believe it is probably still too early in the rebuilding/reconstruction period to tell if these education efforts will have a sustained effect. It is possible to state, however, that the majority of houses constructed in the post-earthquake rehabilitation project incorporated seismic features and were constructed to significantly higher standards than the pre-earthquake construction.*

Discussion

Close to 40 percent of the pre-earthquake building stock in the two most affected districts was rehabilitated as part of this project. Whether homeowners continue to voluntarily incorporate all seismic provisions in the future, as recommended in MEERP (and particularly the RRSP), depends on two factors.

- **Earthquake awareness created during the MEERP implementation.** In a project the size of MEERP, it can be realistically assumed that information was not disseminated uniformly to all beneficiaries throughout the entire area. Attention was focused primarily on the two most affected districts, Latur and Osmanabad. Consequently, residents in the other 11 earthquake-affected districts of Maharashtra were not exposed to information related to earthquake-resistant construction technology to the same extent.
- **Financial capability of the residents.** Another important factor that is going to affect reduction in future earthquake losses is the financial capability/economic status of the local population. There are certain cost implications involved in implementing earthquake mitigation (strengthening the existing houses). These additional investments (even if they amount to only a small percentage of the original cost) may not be possible for all villagers to make.