The Yogyakarta and Central Java Earthquake 2006
The Recovery Status Report: the Yogyakarta and Central Java Earthquake 2006 was developed as collaboration between

Gadjah Mada University

and

International Recovery Platform

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RECOVERY STATUS REPORT

The Yogyakarta and Central Java Earthquake 2006

December 2009
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Foreword 1

The Central Java Earthquake occurred on 27 May 2006. Measuring 5.9 on the Richter scale, it caused extensive damage to Yogyakarta and Central Java. Since then, dedicated recovery efforts have been relentlessly pursued not only by the local people and communities affected, but also by the national government, local governments, and international organizations and donors.

The International Recovery Platform (IRP) Secretariat conducted a survey in Yogyakarta and its surrounding areas in 2006 just after the earthquake struck, and revisited the same area in 2008 to assess the recovery status. The results showed that the recovery process had been proceeding smoothly due to the sincere commitment and contributions of all relevant stakeholders. The Secretariat concluded that valuable recovery lessons might be discovered through a more in-depth review.

At the same time, the Secretariat came to understand that Gadjah Mada University (UGM) had functioned as a hub for mobilizing resources and linking stakeholders to enhance the recovery process, and had learned several lessons that could be useful in addressing the gaps and needs with regard to current recovery operations. The IRP Secretariat therefore decided to initiate, in collaboration with UGM, a series of collaborative projects to study the recovery efforts taken following the Central Java Earthquake of 2006. Over the course of these projects, case studies were conducted on various topics, and field surveys were conducted on shelter, livelihood, and gender issues.

This Recovery Status Report presents the results of all these efforts. We believe that this report provides good case study information and lessons learned which will be useful to the entire community of practice on disaster management. We also hope that it will be of practical use to policymakers, practitioners, and researchers across all countries affected by disasters.

This study represents the IRP Secretariat’s first collaborative undertaking with the academic community. Throughout the process, we have learned a great deal from our dedicated partner, UGM. We would like to express our gratitude to the entire UGM faculty, particularly Dr. T. Yoyok Wahyu Subroto, the leader of the study, and Dr. Diananta Pramitasari, who supervised the compilation and analysis of the case studies.

Based on this experience, the IRP Secretariat will continue to work not only with practitioners but also with academia to promote the sharing of knowledge through similarly collaborative projects.

Atsushi Koresawa
Executive Director
Asian Disaster Reduction Center (ADRC)
December 2009
For the International Recovery Platform Secretariat
Foreword 2

Indonesia is the world’s largest archipelago and straddles one of the world’s most seismically active zones. Unfortunately, the country has been hit by a series of devastating natural disasters in recent years. Indonesia is prone to seismic upheaval because of its location on the so-called Pacific “Ring of Fire,” an arc of volcanoes and fault lines encircling the Pacific Basin. Among the many disasters that Indonesia has endured, the Yogyakarta (Central Java) Earthquake of 2006 was one of the most remarkable. Registering 5.9 on the Richter scale, the earthquake shook Yogyakarta, and in just four minutes, killed 5,782 people, injured 50,000, and left as many as 600,000 residents of Bantul Regency displaced. This town, where 80 percent of the homes were flattened, suffered the worst of the devastation.

Fortunately, the Javanese have their own system of social capital known as "gotong royong," an ancient system of reciprocal labor exchange whereby people offer their time and labor voluntarily to support others when they are in need and thus can call on support from others in return. This systems offers victims a significant emotional boost, helping them cope with the destructive impact of the earthquake on their lives. In the early phases of recovery, people took the initiative in empowering their own communities. It is directed to develop coping strategies to ensure all families can support themselves in transitioning from tarpaulins or tents into permanent housing arrangements within three months. This allowed community groups and other village volunteers to maximize the resources available for achieving an early recovery.

This gotong royong has driven Yogyakarta’s recovery from the 27 May 2006 earthquake, which is considered to be one of the most successful cases of earthquake recovery in Southeast Asia. It was due to the well coordinated efforts of various actors and institutions at the local, national, and international level. As an academic institution, Gadjah Mada University (UGM) was strategically positioned to play an important role in the post-disaster recovery activities. As the hub for mobilizing resources and linking stakeholders to enhance the recovery process, UGM learned several lessons that are sure to prove useful to efforts to address the gaps and ongoing needs in recovery operations. Sharing these lessons with neighbors in Southeast Asia and Asia as a whole will give added value to the achievement of effective recovery operations in the region.

The Recovery Status Report presents the general concepts of the earthquake disaster recovery programs with some specific case studies on important topics, including the involvement of stakeholders, the development model of post-disaster recovery, and the influence of the development model on society and the recovery process.

This report is a collaborative work primarily between the UGM Department of Architecture and Planning in the Faculty of Engineering, the Asian Disaster Reduction Center (ADRC), and the International Recovery Platform (IRP). It offered the institutions, scholars, and experts involved an opportunity to enhance their competence and capacity on the theme of post-disaster recovery management at the international level.

We would like to express our sincere gratitude to Mr. Atsushi Koresawa, Executive Director of ADRC, and Mr. Yoshihiro Imai from IRP for sharing their ideas for ensuring that this report would be published. We hope that our collaborative relationship will lead to sustainable networking opportunities in the near future.

Dr. T. YOYOK Wahyu Subroto
Head, Department of Architecture and Planning
Faculty of Engineering, UGM
1.1 Background of the Disaster

The earthquake’s magnitude of 5.9 on the Richter scale and duration of 52 long seconds, proved to be too much to for the inhabitants of Yogyakarta and Central Java who were generally unprepared. Occurring at 5:54 in the morning, many people were trapped within their damaged homes and perished even more with succeeding 750 incidences of aftershock, claiming more than 5,716 dead and destroying over 240,396 homes, to become the third major calamity to hit Indonesia within 18 months.

Subsequent investigations found that the earthquake’s epicenter was in the Indian Ocean, south of Bantul district. Fifty-two seconds of violent geological activity initially occurred at a shallow depth of 33 kilometers in the Sunda plate above the subduction zone of the Australian zone. Due to its relatively shallow placement below ground surface, the tremors were more intense than those produced with deeper earthquakes of the same magnitude. This accounts for the intensive damages in the Bantul and Klaten areas.

![Geographic Distribution of Earthquake Casualties](image)

Figure 1.1 Geographic Distribution of Earthquake Casualties

Source: Preliminary Damage and Loss Assessment, Bappenas

1.2 Emergency Response

**President Mandate and Priority for Immediate Response**

President Susilo Bambang Yudhoyono arrived in Yogyakarta some hours after the disaster and relocated his office there from May 27 to 31 to monitor the emergency relief efforts personally. The President published an instruction to give priority for the relief action and providing aid to the victims. Based on
the president’s mandate, The National Disaster Management Agency (BAKORNAS), led by Vice President Jusuf Kalla, had undertaken the initial coordination of emergency relief and rescue efforts. The response was in close cooperation with the Coordinating Ministry of People’s Welfare, Ministry of Social Affairs, the military, local governments, and various United Nations agencies.

Preliminary Assessment of the Damages and Losses

Meanwhile, under the leadership of National Development Planning Agency (BAPPENAS), supported by a strong team of Indonesian and international specialists, the Government launched Preliminary Assessment of the Damage and Losses mission on May 30, 2006 to the affected districts, and was able to provide a detailed report by June 14, 2006. The report provided the Government and the international community a clearer understanding of the impact of the disaster, and a basis for designing reconstruction and recovery programs.

1.3 Compliance of Recovery Process to HFA

Efforts to reduce disaster risks in Indonesia have been set out in an implementation framework that focuses on several immediate key actions. RAN-PRB has identified several priorities for implementation that will later be elaborated in a more operational plan of action. Initiatives to reduce disaster risks in Indonesia strive for sustainability and participation by all stakeholders. Strong commitment to selected priority actions characterizes these efforts. These priorities serve the purpose of laying a strong foundation for the implementation of an integrated sustainable disaster risk reduction programmes as compliance to the international commitment HFA.

Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation

- Identify, assess and monitor disaster risks and enhance early warning
- Use knowledge, innovation and education to build a culture of safety and resilience at all level
- Reduce underlying risk factors
- Strengthen disaster preparedness for effective response at all levels
CHAPTER 2: DAMAGE AND RESPONSE

2.1 Damage and Impact Assessments

The greatest impact of the disaster is the fact that Barangay Guinsaugon was totally buried with family. More than 1.1 million people in the provinces of Yogyakarta and Central Java were affected by this earthquake. The Preliminary Damage and Loss Assessment Statistics report was based on qualitative field reports, preliminary findings of rapid assessments conducted by the University of Gajah Madah in 50 villages, and information collected on 1,600 households in 50 affected villages as of June 2006. The report indicated 5,716 confirmed deaths and 37,927 survivors with severe injuries. The most affected sectors were Housing and Productive sectors with the total damages estimated at Rp 29.1 trillion or USD 3.1 billion. Information on the damage and losses caused by the earthquake is shown in the table below.

Table 2.1 Damage and Impact of Yogyakarta and Central Java Earthquake 2006

<table>
<thead>
<tr>
<th>Sector</th>
<th>Damage</th>
<th>Disaster Effect</th>
<th>Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households</td>
<td>13,915</td>
<td>1,382</td>
<td>15,296</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>397</td>
<td>154</td>
<td>551</td>
</tr>
<tr>
<td>- Transport and Telecommunications</td>
<td>90</td>
<td>0</td>
<td>90</td>
</tr>
<tr>
<td>- Energy</td>
<td>225</td>
<td>150</td>
<td>375</td>
</tr>
<tr>
<td>- Water and Sanitation</td>
<td>82</td>
<td>4</td>
<td>86</td>
</tr>
<tr>
<td>Social Sectors</td>
<td>3,906</td>
<td>77</td>
<td>3,828</td>
</tr>
<tr>
<td>- Education</td>
<td>1,683</td>
<td>56</td>
<td>1,739</td>
</tr>
<tr>
<td>- Health and Social Protection</td>
<td>1,569</td>
<td>21</td>
<td>1,590</td>
</tr>
<tr>
<td>- Culture and Religion</td>
<td>654</td>
<td>0</td>
<td>654</td>
</tr>
<tr>
<td>Productive Sectors</td>
<td>4,348</td>
<td>4,676</td>
<td>9,024</td>
</tr>
<tr>
<td>- Agriculture</td>
<td>66</td>
<td>640</td>
<td>706</td>
</tr>
<tr>
<td>- Trade</td>
<td>184</td>
<td>120</td>
<td>304</td>
</tr>
<tr>
<td>- Industry</td>
<td>4,063</td>
<td>3,899</td>
<td>7,962</td>
</tr>
<tr>
<td>- Tourism</td>
<td>36</td>
<td>18</td>
<td>54</td>
</tr>
<tr>
<td>Cross-Sectoral</td>
<td>185</td>
<td>110</td>
<td>295</td>
</tr>
<tr>
<td>Government</td>
<td>137</td>
<td>0</td>
<td>137</td>
</tr>
<tr>
<td>Banking, Finance</td>
<td>48</td>
<td>0</td>
<td>48</td>
</tr>
<tr>
<td>Environment</td>
<td>0</td>
<td>110</td>
<td>110</td>
</tr>
<tr>
<td>Total in IRD</td>
<td>22,751</td>
<td>6,399</td>
<td>29,149</td>
</tr>
<tr>
<td>Total in Million US$</td>
<td>2,446</td>
<td>688</td>
<td>3,134</td>
</tr>
</tbody>
</table>

The report showed that the earthquake damaged approximately 90.52% of private assets held in the housing, social, and productive sectors. By contrast, damage to public facilities, the infrastructure, and cross-sectoral resources in the affected districts was relatively small. The government classified two regions as the most severely affected, Bantul (in Yogyakarta special province) and Klaten (Central Java province), where human losses and property damage were particularly high. These districts were thus also identified as having the greatest immediate need for relief and assistance. The other nine districts affected were Sleman, Gunung Kidul, Yogyakarta City, and Kulon Progo in Yogyakarta special province, and Sukoharjo, Magelang, Purworejo, Boyolali, and Wonogiri in Central Java province.
Table 2.2 The Damage Houses caused by Yogyakarta and Central Java Earthquake 2006

<table>
<thead>
<tr>
<th>District</th>
<th>Destroyed</th>
<th>Disaster Effect</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Damaged</td>
<td>Total</td>
</tr>
<tr>
<td>Wonogiri</td>
<td>23</td>
<td>93</td>
<td>0.03%</td>
</tr>
<tr>
<td>Boyolali</td>
<td>715</td>
<td>1,540</td>
<td>0.43%</td>
</tr>
<tr>
<td>Majelang</td>
<td>499</td>
<td>1,228</td>
<td>0.34%</td>
</tr>
<tr>
<td>Purworejo</td>
<td>144</td>
<td>904</td>
<td>0.25%</td>
</tr>
<tr>
<td>Magelang</td>
<td>1,185</td>
<td>1,673</td>
<td>0.47%</td>
</tr>
<tr>
<td>Sukoharjo</td>
<td>79,890</td>
<td>166,666</td>
<td>46.46%</td>
</tr>
<tr>
<td>Klaten</td>
<td>103,689</td>
<td>172,104</td>
<td>47.98%</td>
</tr>
<tr>
<td>Central Java</td>
<td>66,415</td>
<td>103,689</td>
<td>47.98%</td>
</tr>
<tr>
<td>Kulon Progo</td>
<td>6,793</td>
<td>9,417</td>
<td>4.52%</td>
</tr>
<tr>
<td>Yogyakarta City</td>
<td>4,831</td>
<td>8,422</td>
<td>3.55%</td>
</tr>
<tr>
<td>Gunung Kidul</td>
<td>15,071</td>
<td>33,038</td>
<td>22.42%</td>
</tr>
<tr>
<td>Sleman</td>
<td>34,231</td>
<td>49,032</td>
<td>22.27%</td>
</tr>
<tr>
<td>Bantul</td>
<td>100,817</td>
<td>172,104</td>
<td>47.98%</td>
</tr>
<tr>
<td>Boyolali</td>
<td>156,664</td>
<td>202,032</td>
<td>100.00%</td>
</tr>
<tr>
<td>Yogyakarta Province</td>
<td>88,249</td>
<td>186,592</td>
<td>52.02%</td>
</tr>
</tbody>
</table>

Source: Preliminary Damage and Loss Assessment, Bappenas 2006

Economic Impact

The economic losses in the affected districts are unlikely to have a major effect on overall economic activity from a national standpoint. Before the earthquake, the 11 affected districts contributed about 2.2% to national GDP. The two districts most severely affected, Klaten and Bantul, contributed about 0.4%. The main impact on the national economy is likely to come from the funding that is likely to be allocated for the reconstruction effort and the implications for the national government finances. The estimated losses in value added in the affected areas approximately up to 5.6% of their aggregate GRDP.

Given a forecasted growth rate of 5.5%, net economic growth in the affected areas was expected to decline around 1.3% in 2006 and 4.2% in 2007 (the change relative to the pre-disaster GRDP projection is -4.2% for 2006 and -1.3% for 2007). Based on this report’s economic loss estimates, the projected GRDP for FY 2006 in the area (Rp 51 trillion) was expected to fall by Rp 2.1 trillion. This is not significant at the national level (the estimated decline is only 0.1% of GDP). Assuming a normal recovery, it was estimated that 75% of the total loss in value added would have an effect in 2006 (approximately 4% of GRDP) while the remaining 25% would be absorbed in 2007 (roughly 1% of GRDP). The productive sectors, where performance was most severely affected, were manufacturing, energy, and water and sanitation services. These were expected to decline by 20%, 5%, and 2%, respectively. Other sectors fared better, with anticipated declines of less than one percent over the two years following the earthquake. From a local perspective, the Bantul district’s economy was the most heavily affected, followed by Klaten and Kulon Progo (GRDP was expected to decline by 23%, 9%, and 7%, respectively, in 2006 compared to pre-earthquake projections). The aggregate decline in GRDP in the whole of Yogyakarta in 2006 was estimated to be approximately 6.7%, whereas the impact in Central Java was estimated at only 0.24%.

Social Impact

Qualitative reports indicated that trauma levels were high in the severely affected areas. Children showed strong stress reactions, including sleeping problems, feeling scared and crying easily, and fevers. Adults experienced headaches and stomachaches, flu symptoms, and common colds. Stress was increased by the activity of the Merapi volcano. While certain communities were well organized with regard to rubble removal, many people were afraid to start repairs on their houses or go to work, especially in the fields. Women and girls consistently emphasized the need for underwear, sanitary napkins, and cooking equipment. Basic facilities to ensure privacy were of particular concern for women, especially those menstruating. There is evidence that the earthquake hit the poor somewhat harder than others. In a preliminary survey, 42% of households headed by someone with only a primary school education reported that their housing had been destroyed. Among those with higher levels of education, this percentage was around 31%. However, there was no correlation between having received a BLT...
(unconditional cash transfer) and home destruction. Many poor people live in wooden or bamboo houses rather than concrete structures, and these proved to be more resistant to the earthquake motion. While 40% of houses with concrete walls were reported to be completely destroyed, only 16% of wooden and bamboo houses suffered such destruction.

The earthquake is estimated to have impoverished an additional 67,000 households and increased the poverty ratio by 1.6% in the affected areas. Baseline data on poverty and data on the destruction of housing and lives at the sub-district level were used to assess the impact on poverty.

2.2 Key Sector-Specific Facts and Issues

Though the number of causalities was, fortunately, lower than that caused by comparable disasters, the damage and losses had several specific components that resulted in this disaster’s characterization as the most costly natural disaster in Indonesia. According to the preliminary damage assessment, there were several key sector-specific facts and issues at work:

- The impact of the disaster was highly concentrated in the districts of Bantul in Yogyakarta special province and Klaten in Central Java province.
- The damage was heaviest among houses and privately owned buildings.
- Over 650,000 workers were employed in productive sectors affected by the earthquake, and close to 90% of these were concentrated in small and medium-sized enterprises. As many as 30,000 enterprises were affected either directly or through the disruption of the supply chain, making livelihood recovery an urgent priority.
- Social sectors also experienced significant damage, including damage to public and private health and education facilities.
- Most rural and urban infrastructure remained intact and suffered only minor damage.
- The private sector was the most heavily affected by damage and losses.

2.3 Institutional Planning Framework

The government of Indonesia initially allocated 1.0 trillion rupiah from the national budget for relief and reconstruction activities. Of this amount, the National Disaster Management Agency (BAKORNAS) was provided an initial 75.0 billion rupiah for emergency response efforts. Unlike the case of the Aceh Tsunami Recovery planning that the Recovery Planning and action delegated to the National Government Disaster Recovery Team, Yogyakarta and Central Java provincial governments decided to improve their disaster response capacity through the implementation of their recovery plan. The national government has yet to announce any coordinated arrangements for the rehabilitation and reconstruction process.

2.4 Recovery Funding and Donor Commitments

On May 29, 2006 the Coordinating Minister for Economic Affairs held a meeting with the donor community to call upon donors to mobilize donor support. The international community was quick to respond, and had committed approximately US$80 million as of June 2006. Six donors (the European Union, the Netherlands, United Kingdom, Canada, Denmark, and Finland) committed to assist in rebuilding the earthquake and tsunami-affected areas of Yogyakarta and Central Java. The Java Reconstruction Fund (JRF) was established under the management of the Coordinating Ministry for Economic Affairs to collect funds for supporting the government’s post-disaster recovery program.
2.5 Immediate Response from International Organizations

Funds for disaster recovery can be generally categorized into two major classifications: public funds that immediate action taken by various international and local humanitarian groups helped alleviate critical post-disaster risks. Within 24 hours after the earthquake, CHF International had deployed emergency response staff and relief supplies to communities that had yet to receive disaster response assistance from government authorities. Furthermore, in coordination with Direct Relief International, AIG Companies of Indonesia and Singapore, UNICEF, and USAID, CHF International was able to put up emergency outposts, distribute relief supplies, conduct appraisals of health, nutritional, and shelter needs, and set up systems of community communication and organization. Probably as a result of their ongoing post-disaster rehabilitation programs in nearby regions, these non-governmental agencies were able to anticipate the needs that might arise from the eruption of Mt. Merapi. The readiness level of emergency facilities was high. Right after the earthquake, the International Federation of Red Cross and Red Crescent Societies (IFRC), various UN agencies, and 35 other international NGOs were able to mobilize essential emergency relief supplies as well as to dispatch medical and other disaster management personnel.

2.6 Immediate Distribution of Relief Supplies and Cash

The job of distributing relief materials and cash was delegated to the National Disaster Management Agency of Indonesia, BAKORNAS, which undertook the initial coordination of emergency relief and rescue efforts in close cooperation with the Coordinating Ministry of People’s Welfare, the Ministry of Social Affairs, the military, and various UN agencies with full support from the provincial governments of Central Java and Yogyakarta.

**Relief Aid**

Response teams, medical teams, and military units from around the country were deployed to the affected provinces. Medical expenses for earthquake-related injuries were covered by the government when treatment was sought at public facilities.

**Cash and Material Aid**

During the emergency phase, the government distributed a one-time cash transfer of Rp 90,000 and 10kg of rice per person, Rp 3,000 per person per day, a one-time grant of Rp 100,000 per person for clothing, and another Rp 100,000 per household for kitchen equipment, amounting to Rp 200 billion (US$22 million) in total. In addition, it also provided free healthcare to the injured, supplied emergency accommodation for schools, and provided tents as temporary trading places for traders who had lost their permanent business premises.

The International Organization for Migration (IOM) established strategic partnerships with area hospitals and launched a series of transport, logistics, and medical initiatives. It also opened relief stations at airports in Surakarta and Yogyakarta to speed up the delivery of aid. The IOM has also developed programs and conducted trainings for the early detection, proper assessment, and prevention of mental illness in the most affected communities, has distributed 250,000 tarpaulins, blankets, and sleeping mats, as well as 500 baby kits to pregnant women and mothers with newborns, and has provided technical assistance and materials for building basic bamboo shelters.
CHAPTER 3: SECTOR-SPECIFIC RECOVERY AND CASE STUDIES

3.1 Shelter

Muhammad Sani Roychansyah

Role of Shelter in the Recovery Process

Shelter is an essential component of any disaster recovery effort, just as it was in the case of the 2006 Yogyakarta Earthquake, which caused extensive housing damage and had a tremendous impact on all aspects of daily life. The rate of damage in the housing sector in several of the sub-districts of Bantul and Klaten, some of which had once-booming small-scale handicraft industries, was as high as 90%. Many buildings that were severely damaged or that collapsed entirely did not comply with earthquake-resistant building requirements, used low quality building materials, lacked a wall confinement element, lacked joints, or were built on unstable ground. The economic growth of these regions slowed down as a direct result of the quake, as productive activity conducted largely by home-operated small and medium-sized enterprises ground to a halt (see Table 3.1 for a summary of damage and losses in each sector). This is why Bappenas (2007) contends that the losses resulting from the Yogyakarta Earthquake were greater than those caused by the 2004 tsunami in Sri Lanka, India, and Thailand.

Table 3.1 Summary of damage and losses by sector and the share of government support for Recovery

<table>
<thead>
<tr>
<th>Sector</th>
<th>Damage (trillion rupiah)</th>
<th>Losses (trillion rupiah)</th>
<th>Total (trillion rupiah)</th>
<th>Government Support (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelter</td>
<td>13.5</td>
<td>1.4</td>
<td>15.3</td>
<td>46</td>
</tr>
<tr>
<td>Production</td>
<td>4.3</td>
<td>4.7</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>Social</td>
<td>3.9</td>
<td>0.1</td>
<td>4</td>
<td>70</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>0.4</td>
<td>0.2</td>
<td>0.6</td>
<td>60</td>
</tr>
<tr>
<td>Inter-sectoral</td>
<td>0.2</td>
<td>0.1</td>
<td>0.3</td>
<td>66</td>
</tr>
<tr>
<td>Total</td>
<td>22.8</td>
<td>6.4</td>
<td>29.1</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: Bappenas, 2007

The number of unhabitable houses in Yogyakarta Province was 161,389, or about 74% of the houses in Bantul Regency, while the number in Central Java Province was 96,303, or more than 98% of the houses in Klaten Regency (NTT, 2007). In response to the damage sustained by these more than 250,000 houses and other structures in Yogyakarta and Central Java, it was initially unimaginable how the government of Indonesia and related stakeholders would be able to handle this heavy devastation through a set of systematic policies and programs. While addressing the situation, it was decided that shelter would remain the key priority from the early stages of the emergency response efforts, through the transitional response, and into the rehabilitation and reconstruction phase. It was believed that an accelerated fulfillment of shelter needs would facilitate the revival of other sectors, especially the economic sector.

All agree that the quicker the rehabilitation and the faster that people are able to move back into their homes, the swifter will be the recovery of other sectors (NTT, 2007). However, this requires a long-term complex response. A wide range of intermediate options lay between the provision of emergency shelter and the permanent reconstruction of housing (UNDROS, 1982). To achieve this goal and seek appropriate options, the metamorphosis of shelter provisions following the Yogyakarta Earthquake could be well observed and divided into three important steps (see Figure 3.1). First, in the immediate aftermath of the earthquake, in response to a request for housing assistance and in cooperation with government, local and international stakeholders, various organizations, individuals, and community groups distributed emergency shelter supplies (e.g. tarpaulins, mattresses, blankets, and other non-food,
non-medicine items). These types of emergency shelters are only a short term solution and will not provide adequate shelter to cover transitional needs through the two to three years required for preliminary reconstruction.

Second, to capture weaknesses of characteristic in the first step of emergency shelter and to bridge long preparation of reconstruction for permanent shelters, transitional shelter that also integrates other sectors such as water, education, and economic and social livelihoods was provided as flexible choice and widely implemented in the devastated areas (see Ikaputra, 2008). However, this step should be taken carefully by explaining to communities that transitional housing is not a permanent solution. This is to avoid claims that temporary houses as fixed houses and may influence difficulties to move to the permanent houses. The importance of implementing a transitional shelter program is initially just as an effort to prevent the further deterioration of community health due to unhealthy living conditions under tents and tarpaulins donated to the affected communities. The improved living conditions provided by transitional shelters would significantly facilitate the community’s recovery. This approach was also popularized by Corsellis and Vitale (2005) based on some experiences in providing shelter during complex emergencies involving post-disaster and post-conflict situations. It contains elements of the pressure and release (PAR) model, and could thus increase the sustainability of the settlement and reduce the vulnerability of the community.

Third, the final step forward a full and permanent recovery is a post disaster rehabilitation and reconstruction program designed to start as soon as possible after a two-month emergency response period. Of the programs undertaken, the rehabilitation of people’s houses and residential areas were given top priority. As reported by NTT (2007a), this rehabilitation and reconstruction process has been designed in such a way as to get communities involved as much as possible. Public involvement happens at various levels, at the district level, sub-district level, village level, and even up to community level group (Pokmas in Yogyakarta) or community self-reliance housing group (KSMP in Central Java). Under this arrangement, a sense of collectivity, solidarity, and tolerance emerged in the community. Consequently, it brought versatility of local wisdom as its development strategy.

**Framework: “Roof First” Strategy**

This chapter will discuss each stage of shelter development and the characteristics of those shelters based on specific situations. As shown in Table 3.1, the Indonesian government could only provide assistance to the shelter sector of up to 60% of its domestic budget. Funding will be able to be released from DIPA (Daftar Isian Pelaksanaan Anggaran), which is the Budget Realization Inventory List over several years of project implementation. This means that the cooperation of foreign donors is essential.
to the provision of shelter. The Indonesian government's inability to cover the need for shelter is not only due to a lack of finances, but also due to the fact that the scale of the disaster was much greater than initially believed. To meet the need for shelter, the Indonesian government, United Nations (UN) agencies, and other humanitarian partners have developed a joint “roof first” strategy to be implemented from the time aid is first provided up to the stage of community rehabilitation (OCHA, 2006).

![Diagram of T-shelter designs and construction modules](image)

Figure 3.2 Examples of T-shelter designs and their construction modules (Ikaputra, 2009)

Emergency shelter following the 2006 Yogyakarta Earthquake was an urgent basic need of those who had been displaced by the disaster. Shelters protect those affected from the elements, such as rain and wind, and also from unsafe environments, as they are ensure that groups of people are gathered all together in one place. After the Yogyakarta Earthquake, emergency shelter clusters were coordinated by the International Federation of Red Cross and Red Crescent Societies (IFRC), as convener in the global shelter cluster. During the initial response stage, Barron from the IFRC (2006) calculated that with an average household size of 4.3, at least 1,173,742 people, and perhaps as many as 1,542,380 were left homeless by the earthquake. However, the provision of tarpaulins and tents has been limited to those distributed by the humanitarian aid community and the Indonesian government. By the end of July 2006, or almost two months after the earthquake when the emergency phase was supposed to have ended, almost 30% of those left homeless still had not made the transition to a transitional shelter. Fortunately, despite these shortages, there were many cases in which the affected communities, particularly those in urban and semi-urban areas, were still able to build emergency shelters with bamboo, tarpaulins, and relevant materials supplied by aid agencies or civil society organizations. In some cases, they sorted and reused building material debris, such as bricks, timber, and window and door frames. In others cases,
villages that had sustained less than 20% damage accommodated those made homeless using a kinship family model within the village.

An important goal during the emergency response period was to provide people with temporary shelter. In addition to providing thousands of tents, both national and international organizations also provided temporary houses. They described those houses as temporary or transitional shelters, popularly called T-shelters (TTN, 2007). According to Ikaputra (2009), most of the T-shelters used during the transitional stage of the post-disaster recovery were made of bamboo. Bamboo was selected as the preferred construction material because of its cost of production, availability, and strength. The utilization of bamboo allowed for the development of several T-shelter unit sizes, such as 2x2, 2x3, and 3x3. It also allowed for T-shelter sizes T-18, T-24, and T-36, whose dimensions fulfill the minimum internal space required for a family (see Figure 3.2). The stakeholders involved in the development process, including designers, donors, and other supporters had a significant influence on both the construction design and mode of implementation. Suryabrata (2009) explained that there were three different levels of community participation with regard to shelters: participation in the design process, participation in contributing materials for transitional shelters, and participation in the construction process.

Figure 3.3 Interrelationships among institutions involved in the disbursement of direct housing assistance (Source: TTN, 2007)

Actually, Parikesit (2009) argued that the government only recommended a one-step policy, which meant that the emergency shelter program was to be followed immediately by an initiative for a permanent housing program. However, the mass production of T-shelters, which was supported by the international community and various NGOs, filled the gap during the time when the government was concentrating its efforts on the reconstruction of permanent housing. In fact, as was reported by Suryabrata (2009), within seven months of the start of the emergency response, more than 70,000 bamboo T-shelters had been built by international NGOs in addition to the large number of T-shelters that had been built by local NGOs and communities. Transitional shelters inevitably proved to be a useful and successful component of permanent reconstruction efforts, and promoted an early return to livelihood activities. Independent surveys by the World Bank conducted as part of the internal housing review process, as well as other agency surveys, indicate that occupant satisfaction and material reuse in transitional shelters has been very high overall (Manfield, 2007).
Since the regional governments of both Yogyakarta and Central Java, including their municipal governments, were capable of carrying out disaster relief activities, the central government did not form any special authority of its own to manage the relief program. The capabilities of the regional governments helped to strengthen the coordination of teams at the national level, village level, and community level. Furthermore, as was noted by TTN (2007), the most important phase of post-disaster rehabilitation and reconstruction occurred when the government set up an official housing assistance program to speed up the rehabilitation process and to support the fulfillment of basic housing needs. This form of assistance only applied to privately owned houses. Rented houses were not eligible for financial support. During socialization of this term and condition, the government also promoted three stages of rehabilitation and reconstruction: preparation, identification, and development. The first stage, preparation, is highly reliant on the identification of consultants, the recruitment of facilitators, and community organization. The second stage, identification, was comprised of the identification of victims who were entitled to assistance, the establishment of community groups, and participatory planning efforts in which housing rehabilitation proposals were produced. The final stage, development, involved the development of houses by the people themselves based on priorities they had established on their own. The government provided housing assistance to each family in the amounts of 20 million rupiah in Central Java and 15 million rupiah in Yogyakarta. The 5 million rupiah difference was due to the need to develop public facilities in Yogyakarta since that region sustained a greater degree of damage to its infrastructure than Central Java. Each Pokmas/KSMP consisted of 8-15 families who had lost their houses in the quake, and each was required to open a bank account through which the Direct Housing Assistance for the Community (BLMP) would be channeled. An overview of this program is shown in Figure 3.4.

According to TTN (2007a), several principles of housing assistance had to be established. First, priority was to be given to the poor whose houses either collapsed or were heavily damaged. These are the houses that were ultimately considered to no longer be inhabitable by the community at the sub-district or village level. Second, assistance was to be used solely for housing construction, and priority was to be given to the development of housing structures that are earthquake-resistant (footings, tie beams, columns, ring beams, roofs, and walls). Third, any funds remaining after these structures have been built were to be used by the recipients (communities) to build other non-structural components of the houses (walls, doors, windows, etc). Fourth, the funds were not to be used for purposes other than housing reconstruction. In the process of program implementation with the same scheme, the Indonesian government disbursed a total of 5.4 trillion rupiah to help rebuild 279,000 houses and to rehabilitate 253,000 others. In addition, financing was provided by the non-government sector, including donor agencies. One of the greatest sources of assistance for the victims of the disaster in Yogyakarta, Central Java, and later West Java was the Java Reconstruction Fund (JRF), which consisted of six donors who provided donations valued at more than US$80 million or almost 1 trillion rupiah. Of this...
amount, 75% was spent on the implementation of the Community-Based Settlement Rehabilitation Reconstruction Project (CSRRP), better known as JRF-REKOMPAK, with was expected to rehabilitate 15,153 houses in Bantul Regency in Yogyakarta Province and Klaten Regency in Central Java Province (JRF, 2008). Within a year and a half after the quake, almost 90% of the shelters were completely finished. However, problems still remain with regard to the quality of the shelters created using funding from the Indonesian government (see Figure 3.4)

**Current Status**

This chapter will describe the progress that has been made and the current status of reconstruction efforts based on a recent field survey conducted in July-August 2009. The survey was conducted in three sub-districts or villages that received funds for shelter rehabilitation and reconstruction with different schemes: Kotagede, Kasongan, and Trimulyo. Kotagede Sub-District is located about 6 km to the southeast of Yogyakarta City, and was known as the capital of the Islamic Mataram Kingdom almost 256 years ago. Kotagede (with an area of 442.67 ha and a population of 36,303 as of 2006) belongs to two administrative entities, Yogyakarta Municipality and Bantul Regency. It consists of five sub-districts or villages: Prenggan Sub-district, Purbayan Sub-district, Basen Sub-district (belonging to Yogyakarta Municipality), Jagalan Village, and Sigosaren Village (belonging to Bantul Regency). Beside its reputation in the silver crafts, Kotagede is also a center of Javanese crafts, food, arts, and culture, and its communities rely heavily on these activities. The second location, Kasongan Village is one of the Bangunjiwo Villages located in Kasihan Sub-District, about 7 kilometers south of Yogyakarta, and consists of several dusuns (settlement units). Kasongan has long been known for its handmade terracotta pottery. Most of the people in Kasongan are pottery craftsmen and others involved in the pottery industry, such that their socio-economic lives depend on their pottery production facilities. The third location, Trimulyo Village belongs to Jetis Sub-District, and is located about 15 km south of Yogyakarta. This village community has many skilled construction workers, and is one of the main construction worker clusters in Bantul Regency. All of these locations where shown to have inadequate earthquake-resistant houses, and all three sustained significant earthquake damage.

A small research project was conducted based on in-depth interviews with several respondents to examine the effects of shelter rehabilitation and reconstruction on the restoration of pre-earthquake daily activities, and to evaluate the quality of the settlement environment in the post-disaster recovery process. Two hundred respondents were chosen randomly, based on a list of funding recipients. The respondents were also fairly divided among the locations, so that the role of shelters related to the specific attributes of the locations could be observed. Kotagede is known for its historic houses and silver crafts, Kasongan for its village livelihood and pottery workshop, and Trimulyo for its village livelihood and construction worker houses. Information provided by the sub-district/village head and other key persons, as well as by the funding recipient list, indicated that in Kotagede Sub-District, mainly in Purbayan Sub-District and Jagalan Village, shelter rehabilitation funding was predominantly provided by the Indonesian government. Donations from the JRF were focused on disaster mitigation and supporting heritage district reconstruction. In Kasongan Village, donations were predominantly provided by the Indonesian government. In Trimulyo Village, the community received shelter rehabilitation and reconstruction funds from the Indonesian government, the JRF, and a small amount from the Urban Poverty Reduction Project (P2KP). Many Trimulyo Village residents had benefited from International Organization for Migration (IOM) T-shelters. Figure 3.5 shows recent conditions in each location with regard to earthquake remnants, including building debris and T-shelters (left), new housing (middle), and the general living environment (right).

In general, the results of the survey revealed that most respondents are satisfied with the rehabilitation and reconstruction of their housing. They are well aware that the funding provided by the Indonesian government and international NGOs was not enough to create the ideal house, but it was very useful in motivating them to rebuild their lives and get back to living normal life in a new situation. The use of a facilitator to assist in the shelter reconstruction process from the very beginning was helpful. Respondents acknowledged that the landscape and scenery has changed, but that the changes have
tended to be for the better. Since rebuilding, they feel that they have experienced some positive benefits from the process of reconstruction, such as infrastructural improvements in the drainage system, roads, and waste management. They respect their living condition, so they are willing to get involved in related activities, such as the preservation and conservation of houses, as well as the use of houses for handicraft activities in Kotagede, the optimization of houses for the development of businesses and workshops in Kasongan, and the creation of safer houses for the construction workers of Trimulyo. It was agreed that assistance would be provided on future plans regarding living condition improvements through relevant programs, such as market access, incentive, workshop, mobilization, and communication.

![Kotagede Sub-District](image1)

![Kasongan Village](image2)

![Trimulyo Village](image3)

Figure 3.5 Condition of surveyed villages: remnants of the earthquake or the emergency response stage (left), new housing (middle), the general living environment (right)

**Lesson Learned**

Given the nature and scale of the devastation caused by this earthquake, the first recovery policy formulated when the emergency phase ended addressed the rehabilitation and reconstruction of houses and residential areas through a community-driven approach. It was the continuation of roof first aids during first stage of emergency. This was a very strategic choice based on the notion that the quicker the restoration of shelter and the faster that people are able to move back into their houses, the swifter will be the recovery of other sectors. This work is progressing well and at a rapid pace as community members are also investing their own resources into efforts to return to their homes.

To keep its eye on the big picture, the Indonesian government responded quickly by establishing a Coordination Team and entrusting it to handle the reconstruction and rehabilitation strategy planning, and implementation. In spite of the devastating effects of the earthquake, governments from the sub-district level to the highly responsive provincial level of the Yogyakarta and Central Java governments have been very capable of effectively supporting this central government approach. The central government committed 5.4 trillion rupiah from the national budget to finance the reconstruction over
two years. Funds were quickly disbursed to the provinces and reconstruction was initiated very quickly. This has resulted in one of the largest community-driven housing reconstruction programs in the world, one which has undertaken the task of building more than 250,000 houses in the disaster-affected areas.

Transitional shelters play a significant role in the process of shelter recovery. They have been proven to serve as a useful component of successful permanent reconstruction and have promoted an early return to livelihood activities. It was a strategy to accelerate the reconstruction process by addressing the need for suitable temporary housing while adhering to the government’s plan to keep up a good pace toward permanent housing reconstruction. In fact, transitional housing also provided opportunities for some families to monitor the reconstruction process of their permanent homes right on site. The provincial governments of Yogyakarta and Central Java, together with the UN-led early recovery support cluster have effectively built transitional shelters of various types, addressing the needs of the community before shifting to permanent housing.

The devastation of more than 250,000 houses and the suffering of thousands of displaced residents have emphatically underscored the importance of adhering to safe building standards, maintaining high quality construction, and pursuing appropriate planning and design for densely populated disaster-prone areas. Certain types of construction and considerations regarding disaster mitigation planning were technically required by the Indonesian government and other funding providers of all new houses, such that new shelters would be earthquake-resistant and disaster-sensitive. Because of the community-driven approach, community members became aware of earthquake-resistant housing structures and their disaster-sensitive surroundings in their efforts to obtain permits. In the future, requirements standard, assistance for housing (re)construction - from requirement of building permit to implementation in technical aspects - must be given more attention, to build better disaster-resistance shelter.

The recent survey indicates that the community-driven planning process used by the government and other donors in the process of housing reconstruction and rehabilitation has delivered positive results to those communities. Satisfaction levels are high as communities take ownership of the process, make consensual decisions based on their needs, and distribute resources to those most vulnerable. These community exercises have directly strengthened the existing spirit of social cohesion (e.g. gotong royong) and have significantly improved the ability of the people to develop a more resilient community. The world knows that communities are taking the lead in the reconstruction process and this is aiding in the healing process from this traumatic disaster. Today, reconstruction efforts aimed at completely restoring the previous vitality of the community are still in progress. After shelter rehabilitation and reconstruction is achieved, efforts must focus on reviving livelihoods to ensure a sustainable recovery.

**CASE 3.1.1. Socialization and Training in Earthquake-Resistant Housing Construction for Construction Workers In Trimulyo Village, Jetis Sub-District, Bantul District, Yogyakarta**

IMAN SATYARNO

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**Introduction**

Many of the houses that were damaged or collapsed as a result of the Yogyakarta Earthquake did not comply with earthquake-resistant housing standards. In fact, earthquake-resistant housing guidelines were introduced more than 30 years ago (Boen and Rekanns). Nonetheless, not all of the houses were built according to these guidelines. This is why so many houses sustained damage or collapsed entirely, and the reason for such large losses and casualties following the 27 May 2006 Yogyakarta Earthquake. On-site investigations carried out after the earthquake revealed that almost all of the collapsed houses failed to meet the earthquake-resistant housing standards, and commonly had the following major deficiencies:
1. **Low quality materials**

   The bed joints of brick masonry walls are supposed to be made of mortar comprised of cement and sand. According to the guidelines (P2KP 2006; SOP Seri No. 4; Boen, 1994), the mortar for the bed joints is to be made of cement and sand in a volumetric ratio of 1:4. Investigations revealed that the mortar contained more sand than specified by the guidelines. In some places, the mortar bed joints were found to be made of clay (Figure 3.6.a). This would leave the walls with no strength at all to withstand the lateral forces at work during an earthquake and would ultimately result in a total and sudden collapse. Occupants would not even have enough time to escape from such houses during the earthquake.

2. **No wall confinement elements**

   As mentioned in the earthquake resistant guidelines, brick masonry houses are to have wall confinement elements i.e. plinth beams, columns, ring beams, and gable beams (Figure 3.7). These confinement elements are to be made of reinforced concrete to prevent wall disintegration during an earthquake. Some houses, however, did not have these elements (Figure 3.6.b). Without them, walls tend to disintegrate and collapse.

3. **Inadequate joint detail**

   Some houses were made of fairly good quality material and had wall confinement elements, but lacked proper joint detailing. That is, the reinforcement detailing between the confinement elements was not properly performed. The most common deficiency was inadequate detailing at a corner joint (Figure 3.6.c). In this region, quite a number of reinforcing bars get together in a limited space. The construction workers had difficulties arranging and reinforcing to bars and making hooks.

4. **Built on unstable ground**

   The fulfillment of earthquake-resistant housing standards does not mean that a house becomes earthquake resistant. The underlying ground conditions also determine the level of safety. As was the case in the Yogyakarta Earthquake, some houses will collapse as a result of landslides set off by an earthquake (Figure 3.6.d). Investigations revealed that some of those houses were actually in compliance with the earthquake-resistant housing standards.
c. Inadequate joint detail  

d. Built on unstable ground

Figure 3.6 Deficiencies in collapsed and damaged brick masonry houses damaged by the earthquake (Source: Satyarno, 2007, 2008)

Community Empowerment Program

It is believed that had the earthquake-resistant housing guidelines been properly followed, the number of collapsed houses, and therefore the number of losses and casualties due to the 27 May 2006 Yogyakarta Earthquake, might have been reduced significantly.

Thus, to prevent the same problems from being repeated in future earthquakes, the Community Empowerment Program (CEP) was introduced by the government during the reconstruction process (Karnawati et al. 2008; Satyarno 2008, 2009; Sulistiawan et al. 2007; UGM-JICA 2007). This program was intended to empower the people themselves to reconstruct their own houses. The community participated in some training sessions and workshops so that they could gain basic knowledge about housing construction, especially regarding earthquake-resistant construction methods, based on the guidelines. This approach not only sped up the reconstruction process and minimized costs, but also was a successful means of transferring knowledge about earthquake-resistant housing to the general public.

To simplify coordination, communities were divided into groups of 10 to 15 families. Each group chose three members to serve as leader, secretary, and treasurer for the remaining group members. The leader or other representative of each group would attend trainings or workshops to improve their knowledge about earthquake-resistant housing and building materials, and would then convey what they learned to the rest of their group. They worked together and helped one another reconstruct one another’s houses.
Training of Construction Workers in Trimulyo Village

One of the construction worker training programs carried out by the Department of Civil and Environmental Engineering at Gadjah Mada University took place in Trimulyo Village, Jetis Sub-District, Bantul District, Yogyakarta (UGM-JICA, 2007). This village is one of the main sources of construction workers in the Bantul District. Although this community of construction workers has been engaged in their craft for quite some time, they lack adequate knowledge about earthquake-resistant housing, as they have received virtually no training in such technologies. In fact, this was one of the most devastated areas in the Bantul District, accounting for approximately 872 deaths and 2,044 injuries in the Jetis Sub-District (population: 49,802).

The main objective of this program is to train construction workers in earthquake-resistant housing construction methods, especially those workers involved in the reconstruction process discussed above. Since Trimulyo Village is one of the main sources of construction workers, it is especially important for the training program to be implemented here. The program was conducted from 17 July 2006 to 17 March 2007, with funding provided by the Japan International Cooperation Agency (JICA). The training activities involved class meetings, construction demonstrations, and on-site practical exercises, as shown in Figure 3.7. However, it is also important to note that although the training program was conducted primarily in Trimulyo Village, some activities were also conducted in neighboring villages.

By the end this program, the following trainings had been conducted:

- **Training in Trimulyo**
  
  Date: 2 – 12 October 2006 (10 days) and 16 January 2007  
  Total number of participants: 333

- **Training in Kasongan**
  
  Date: 11 November 2006  
  Total number of participants: 52

- **Training in Pleret**
  
  Date: 21 – 26 January 2007  
  Total number of participants: 60

- **Training in 5 other villages**
  
  Date: Starting 10 February 2007  
  Total number of participants: 701
Lesson Learned

In general, the program can be considered a success in terms of the community enthusiasm it generated and the number of participants that attended. However the following problems need to be noted.

1. Construction workers normally earn wages based on days worked. If they participate in a training program, they may not earn any wages on the days they are off duty. Therefore, a small amount of money must be provided as compensation.
2. It is not easy to change improper cultural norms, habits, or long-established ways of building houses. Only sustainable training programs can fix these problems (JICA-UGM, 2007).
3. The use of earthquake-resistant building construction technologies is sometimes hampered by a lack of homeowner funds. In this case, some of the key requirements of earthquake-resistant housing may not be fulfilled. This is evident in a home extension performed using the homeowners’ personal funds, as shown in Figure 3.8, where the extension has no ring beam as required by the earthquake-resistant housing standards (Satyarno, 2007).

Concluding Remarks

1. A site investigation revealed that some houses might have survived the 27 May 2006 earthquake had they met the earthquake-resistant housing standards.
2. Most damaged or collapsed houses had major deficiencies, including low quality materials, a lack of confinement elements, inadequate joint details, and unstable ground conditions.
3. To prevent the same mistakes in housing construction from being repeated, a Community Empowerment Program was introduced in the reconstruction process. Under this program, community members received training and were involved in rebuilding their own houses to meet earthquake-resistant housing standards.
4. Holding this training program as part of the reconstruction process was a successful means of transferring knowledge regarding earthquake-resistant construction to the community.
5. Problems such as improper cultural norms, habits, or ways of building houses must be addressed by sustainable training programs.
6. Inadequate funding may be the main impediment to the construction of proper earthquake-resistant housing.
CASE 3.1.2. The Use of Recycled Brick Masonry Wall Rubble for Post-Yogyakarta Earthquake Reconstruction

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Introduction

Most communities and governments assume that brick masonry wall rubble is debris that must be disposed of. As can be seen in Figure 3.9, most of the rubble was thrown to the side of the roads. This impeded traffic and sometimes caused traffic jams. To avoid this problem, the government carried out a program to clean away the rubble (Yogyakarta Special Region and Central Java, 2007). As the amount of rubble was huge, this program was very costly.

To ensure that money is spent as effectively as possible, a series of studies has been conducted by the Department of Civil and Environmental Engineering at Gadjah Mada University (Satyarno, 2006, 2007) to develop a procedure for recycling the rubble from damaged brick walls. This is primarily because the price of brick has doubled as compared with the price before the earthquake (Pohan, 2008). Secondly, since the number of houses that must be rebuilt is very large, there will be a problem in supplying the required brick if all the rebuilding is done at almost the same time. The following sections discuss the procedures for recycling rubble.

 Crushing the Rubble

The process of crushing the brick masonry wall rubble can be performed manually or mechanically. This is done to change the brick masonry wall rubble into fine aggregate that can be used for making mortar or concrete. Manual crushing requires the use of a 0.3 to 1.0 kg hammer. Mechanical crushing can be carried out using a mobile stone crusher made by the local people of Bantul, as shown in Figure 3.10. After crushing, the rubble is filtered to create a fine aggregate with a maximum diameter of 5 mm. The site investigation revealed that each machine can crush enough brick masonry wall rubble to create about 15 m$^3$ of fine aggregate per day. This requires one stone crusher operator and six other workers. To make 5 m$^3$ of fine aggregate, the stone crusher needs three liters of diesel oil, yielding diesel oil...
consumption of 0.6 liter/m³. No quantitative data about how much brick masonry wall rubble has been ground into fine aggregate is currently available. However, several stone crushers have been deployed to several villages, and crushing operations have been ongoing for some time.

Figure 3.10 Mechanically crushing brick rubble using a mobile stone crusher to create fine aggregate

_Constructing Houses Using the Cast In-Situ Method Using Mortar Made of Recycled Brick Rubble_

The material needed to make cast in-situ walls is made of mortar using fine aggregate from the crushed brick rubble as discussed above. The volumetric ratio of cement, water, and fine aggregate from crushed brick rubble is 1:1.25:5. In addition, steel bars 6 mm in diameter need to be installed for horizontal and vertical reinforcement with spacing of around 40 cm inside the wall to prevent cracks due to shrinkage. Some formwork units are also required for moulding the mortar in this cast in-situ method. The cast in-situ process can be explained as follows (Satyarno, 2008).

1. Construct plinth beam and columns like the ones required using conventional construction methods. Put anchorages in the columns for connecting the reinforcing bars inside the wall as shown in Figure 3.11. The distance between the columns and their height should be at least 3 m.
2. Set the reinforcing bars inside the wall as shown in Figure 3.12.
3. Use plywood that is 1 cm thick, 1.2 m wide, and 3 m long with some stiffeners for the formworks. The cast in-situ process can be undertaken in three steps, with the first at is 1.20 m high, and the second and third at 0.90 m each.
4. Use a debonding agent such as used oil on the formworks so that they can be easily dismantled as shown in Figure 3.13.
5. Properly mix the water, cement, and fine aggregate from crushed brick rubble to make the mortar, where the volumetric ratio of each material is 1:1.25:5. Pour the mortar into the formwork and then perform the compacting work, as shown in Figure 3.14.
6. The formwork can be dismantled after at least one day, as shown in Figure 3.15.
7. The second and third layers can then be added in the same manner.

_Lessons Learned_

Compared with conventional methods that use brick layers to construct walls, the cast in-situ method using recycled brick rubble has several advantages.

1. The application of the recycled material reduces the costs of rubble cleanup.
2. The cast in-situ process is easily performed and no special brick layer mason is required. Thus, the construction process can be performed quickly.
3. Neither plaster nor finishing is required.
4. The environmental impact caused by large amounts of brick masonry wall rubble can be reduced.

Table 3.2 Cost comparison of walls made using recycled rubble versus Conventional methods for a typical 36 m² house

<table>
<thead>
<tr>
<th>No</th>
<th>Type of wall construction</th>
<th>Volume</th>
<th>Unit Cost (Rp)</th>
<th>Total Cost (Rp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cast in-situ using recycled rubble*</td>
<td>Crushing cost process to get fine aggregate for 1 m² wall</td>
<td>80.85</td>
<td>2,657.31</td>
</tr>
<tr>
<td></td>
<td>b. Pouring process of 1 m² wall</td>
<td>80.85</td>
<td>57,406.21</td>
<td>4,641,292.08</td>
</tr>
<tr>
<td></td>
<td>c. Edge trim of 1 m²</td>
<td>40.4</td>
<td>2,700.00</td>
<td>109,080.00</td>
</tr>
<tr>
<td></td>
<td>Total cost (Rp)</td>
<td>214,843.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Conventional method**</td>
<td>a. Constructing a 1 m² brick masonry wall</td>
<td>80.85</td>
<td>48,490.00</td>
</tr>
<tr>
<td></td>
<td>b. 1 m² of plaster</td>
<td>161.7</td>
<td>16,215.00</td>
<td>2,621,965.50</td>
</tr>
<tr>
<td></td>
<td>c. Edge trim of 1 m²</td>
<td>116.8</td>
<td>3,458.00</td>
<td>403,894.40</td>
</tr>
<tr>
<td></td>
<td>Total cost (Rp)</td>
<td>6,946,276.40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * Excluding the cost of the stone crusher and formworks
** Excluding the cost of removing rubble from the site and environmental impact

Table 3.2 shows a cost comparison of walls made from mortar using recycled brick masonry wall rubble and conventional methods using brick layers for a typical 36 m² house. The costs are based on the prices of materials and construction worker salaries at the end of 2006 after the earthquake. The cost of a wall made using recycled brick rubble is around Rp 1,981,060.81 or 28.5% cheaper than that of a wall made using conventional method, which is Rp 6,946,276.40. However, it is important to note that the cost of a wall made of recycled brick rubble excludes the price of the stone crusher, which is Rp 20,000,000 per unit, and the formworks, which is Rp 22,600,000 per set. As the stone crusher and the formworks can be reused several times, the cost can then be divided by how many times they will be reused. If the stone crusher machine and the formworks are used 100 times, the additional cost will be only Rp 200,000 and Rp 226,000 respectively or the total is Rp 426,000. This additional cost is still less than the different cost mentioned above, which is Rp 1,981,060.81. Therefore, the application of cast in-situ method using recycled brick rubble will be cheaper for mass production. In the conventional method on the other hand, some cost for removing the rubble and the environmental impact must also be added and be taken into account.

Although the cast in-situ method using recycled brick rubble is very promising, this method was not quite successfully be implemented in the construction process of post 27 May 2006 Yogyakarta earthquake due to the following reasons.

1. A lot of removal of brick masonry wall rubble has been carried out when this method was introduced. The community was of course reluctant to bring the rubble back as it would be even more costly.
2. The design of reconstructed houses has been decided to use conventional method using brick layers, the community was afraid of administration problem in their report if they used this new method rather than the conventional one as stated in the design.
3. Therefore only a small number of building and houses were reconstructed using this recycling process, some of them are listed in Table 3.3.

Table 3.3 Reconstruction Using Recycled Brick Masonry Wall Rubble

<table>
<thead>
<tr>
<th>Reconstruction Project</th>
<th>Location</th>
<th>Building area (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDN Monggang</td>
<td>Bangunharjo Village, Sewon, Bantul</td>
<td>154 m²</td>
</tr>
<tr>
<td>SD Muh. Pundong</td>
<td>Guron sub village, Srihardono, Pundong.</td>
<td>160 m²</td>
</tr>
<tr>
<td>Mrs. Hudiyono’s House</td>
<td>Jebukan, Trirenggo, Bantul</td>
<td>75 m²</td>
</tr>
<tr>
<td>Mr. Suryoaji’s House</td>
<td>Karangkajen, Bantul</td>
<td>120 m²</td>
</tr>
<tr>
<td>Sample house in JEC</td>
<td>Jogja Expo Center, Banguntapan</td>
<td>18 m²</td>
</tr>
</tbody>
</table>
Concluding Remarks

From the above discussions the following conclusions and remarks can be made.

1. The recycling process can solve the problem of the large amount of brick masonry wall rubble.
2. Neither brick nor sand is required for the construction of the wall.
3. The cast in-situ process is easier and faster than the conventional method to construct the wall.
4. Neither plaster nor finishing is required for the wall.
5. For mass construction like in the reconstruction process, the cast in-situ method using recycled brick rubble is cheaper than that of conventional one.
6. The recycling process needs to be introduced in other region prior the occurrence of earthquake as alternative of conventional method, had a reconstruction process be required.

Figure 3.11 Construction of plinth

Figure 3.12 Installation of anchors and steel bars for wall reinforcement
Figure 3.13 Preparation of formworks and application of a debonding agent, such as used oil to ensure easy dismantling

Figure 3.14 The mortar is mixed properly, poured into the prepared formwork, and compacted with a stick

Figure 3.15 Formworks can be dismantled after one day
CASE 3.1.3. Adapting Dome Homes for Better Living: Inhabitants’ Preferences

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Introduction

During the 2006 Yogyakarta Earthquake, about 50 homes in Ngelepen, near the famous Hindu Prambanan Temple east of Yogyakarta, were not only shaken by the quake, but were effectively swallowed whole by a catastrophic 30-meter landslide. Houses were ruined, but no one was killed. The village of Ngelepen then was declared to be undevelopable land for geological reasons. Consequently, families that once lived in the village have had to be relocated (Ikaputra, 2008, p. 2).

The Dome Housing Project was the only relocation project to be implemented after the Yogyakarta Earthquake. The relocation project involved the provision of new housing units—“domes”—promoted specifically as earthquake-tornado-fire resistant houses, but culturally considered to be new or imported forms of housing. The dome housing complex and relocation program were completed in April 2007 after about eight months of construction.

Description of the Dome Housing Project

1. Objectives and Background: International Solidarity & Imported Culture

International solidarity has recently become a vital component in responding promptly to requests for support following disasters. Support has come in the form of sharing international knowledge and technology that will help with disaster relief during both the emergency response and reconstruction phases. International solidarity in the area of disaster relief and humanitarian aid has been building a new “global culture” since various devastating disasters have occurred in many places around the world. Such massive efforts, by their very nature, introduce “their own culture and mission” (Ikaputra, 2008, p.1). The Yogyakarta Earthquake Response has revealed evidence of this international tendency since the earthquake struck on 27 May 2006 by getting many international organizations involved in helping hundreds of thousands of homeless earthquake victims survive the crisis and rebuild their lives. The various imported ideas, approaches, methods, technologies, and even cultural concepts were an essential part of the post-disaster relief program resulting from emerging international solidarity. Learning how the imported culture is going to be localized and given a local identity can be blended in an ideal way (Ikaputra and Titisari, 2005). Looking at the process of how aspects of a foreign culture are introduced, adopted, and assimilated into the existing community can adapt to globalization in positive way. According to Breidenbach and Zukriegl (1999), globalization leads to a new level of cultural diversity. The introduction of dome houses following the Yogyakarta Earthquake is an example of this. The
problem with imported culture is characterized by the “newness” of dome which should be adopted or adapted by the local community. Community efforts to adapt the domes to fit their lives is one of the most revealing pieces of proof of the survivors’ self-reliance—an ability to cope with any kind of problem after the earthquake.

2. Period of Project Implementation and Lead Agencies

This project was divided into three phases: (a) pre-project implementation, (b) project implementation, and (c) post-project implementation (see figure 3.17). The project was led by a dynamic agency. In the pre-project phase, Gadjah Mada University (UGM) played a significant role in making the initial contact with the donor, Domes for the World (DFTW), and having discussions and debates about whether the dome culture could be successfully imported. As an important center of community support in the affected area, UGM also connected DFTW with the local government of Sleman so they could discuss the specifics of project implementation, including the appropriate distribution of domes, land sharing, and technical issues.

In the project implementation phase, DFTW served as the lead agency, with the full support of the government of Sleman (from the Kabupaten level down to Kecamatan, Kelurahan and Pedukuhan). UGM contributed by promoting the project within the community. The project aimed to construct a housing complex for the relocation of earthquake survivors left homeless by a landslide in Ngelepen Village. The housing complex consists of six clusters, each of which contains 10-12 domes with one dome for shared facilities called MCK (Mandi, Cuci and Kakus) for bathing, washing, and toilet facilities. In total, there are 72 residential domes and three domes serving as a mosque, kindergarten, and health clinic.

At the end of the project, the government of Sleman took over responsibility for the post-project phase. In this phase, UGM has been conducting ongoing evaluations of how people are adapting to the imported culture of the domes in their everyday lives. This is the primary topic of this paper.

Reviews and Evaluation

Dome housing is completely unfamiliar to many Javanese and other Indonesians. This imported dome shape was attractive to people because of its uniqueness, but there were doubts about whether the domes could be accepted as part of the local culture, and particularly whether they were suited to Indonesia’s tropical climate. At the same time, however, the Yogyakarta Earthquake left thousands homeless and waiting for support, especially the survivors of the Ngelepen landslide, who could not return to their village. What is the rationale for using domes as part of the relocation project?
The rationale to bring domes to the earthquake-prone areas of Java was based on the fact that the domes are believed to be superior to conventional construction, capable of protecting inhabitants from fire, tornadoes, and earthquakes. The need to address the poor seismic resistance of weakly constructed homes, which became the first priority in housing reconstruction after the earthquake, provided another reason to seek alternative construction methods, such as the domes. The questions that were raised during the initial discussion regarding the possible use of dome housing were primarily about the “residential culture,” and could be broken down into four concerns. How would the domes respond to a tropical climate, or fit into the socio-cultural context in rural areas? Would they be affordable? (Ikaputra, 2008, pp. 3-4)

The people wanted to be convinced that the domes, though imported, could be adapted to fit into their local communities. Unfortunately, the DFTW did not provide answers to these questions except to explain that domes have been constructed in the tropical climate of Hawaii. The DFTW developed the dome to serve as a basic residential structure, but left adaptations of the interior open to discussion based on the cultural context.

This study was not conducted to examine the suitability of the domes to Javanese culture. Rather, it aims primarily to understand how families who live in the new Ngelepen community have responded to the dome culture and adapted it to meet their own needs.

**Period of Evaluation**

A series of evaluations have been performed since the residents moved into the domes in April 2007. The first evaluation was conducted after four months to find out how the dome residents felt about their new accommodations and what kinds of intentions they had for improving their living situations. The second evaluation was conducted in 2008, approximately 10-14 months after completion, and focused on the changes made to the dome and the surrounding environment. The last evaluation was conducted in February 2009, about two years after the inhabitants first moved into their domes.

**First Evaluation, August 2007: Opinions about Domes & Intentions for the Future**

In interviews () conducted four months after moving into the domes, inhabitants indicated that living in the domes offered greater levels of safety primarily against earthquakes and landslides. This sense of safety had developed into a sort of “energy psychology”- energy that served the purpose of alleviating the psychological problems of survivors (Feinstein, 2008). The inhabitants’ feelings were consistent with the actual structural strength of the monolithic domes and their ability to survive earthquakes and tornadoes. In the future, dome houses are expected to protect their occupants from injury or death during natural disasters. In addition to being grateful for having a place to live after the earthquake, inhabitants acknowledged that the domes offered better living conditions in several aspects: they are comfortable, quiet, clean, healthy, and neat. Although statistically insignificant, one or two respondents...
mentioned that the domes have good kitchens and are good for gardening. Some were proud to have such simple and unique dome houses (see figure 3.19).

Aside from the process of social engineering (ATSDR, 2005), the success or failure of post-disaster relocation depends on careful site selection (Dikmen, 2006) and considerations of accessibility to livelihood facilities (Birkman et al., 2007). The inhabitants’ opinions regarding the advantages of being relocated (see Figure 3.19) suggest that the new Ngelepen housing site is more strategically located than the former settlement. This could be a good starting point for the whole process of relocation. The political will and role of the Sleman government in working to provide a better location for the resettlement of survivors of the Ngelepen Village landslide were also key elements in the project’s success.

![Figure 3.19 Inhabitants’ opinions about their domes](image)

To learn about the inhabitants' opinions for improving dome housing, we prepared an open-answer survey question: “What would be your first priority for making a home improvement if you had both the opportunity and the funds to do it?” This question was designed to help us understand the weaknesses of the dome structures in positive way. The question was asked three times to collect as many answers as possible, and also to identify the level of priority of various issues among different respondents. We also asked each respondent to draw or sketch their ideas on paper. The sketches complemented the inhabitants’ answers and provided an important component in exploring the ideas provides by respondents for improving their conditions. The results were as follows:

- **Safety (from earthquake & landslide)**: 47
- **comfort**: 19
- **Clean, healthy, & Neatly**: 9
- **Quite**: 9
- **Unique & simple**: 5
- **Having House Post Earthquake**: 1
- **Good kitchen & for Gardening**: 1
- **Good Water facilities & close to MCK**: 12
- **Close to rice field & stockyard (kandang)**: 2
- **Close to work place/school**: 2
- **Close to public facilities (e.g. market)**: 4
- **Close to work place/school**: 5
- **Accessible/Reachable**: 2
- **Good Street**: 2
- **More thoroughfare (rama) & more Tourists**: 2
- **Not interviewed**: 7

**Advantages Living in Dome**
- Safety (from earthquake & landslide) 47
- comfort 19
- Clean, healthy, & Neatly 9
- Quite 9
- Unique & simple 5
- Having House Post Earthquake 1
- Good kitchen & for Gardening 1

**Advantages being relocated in New Ngelepen**
- Good Water facilities & close to MCK 12
- Close to rice field & stockyard (kandang) 2
- Close to work place/school 2
- Close to public facilities (e.g. market) 4
- Close to work place/school 5
- Accessible/Reachable 2
- Good Street 2
- More thoroughfare (rama) & more Tourists 2
- Not interviewed 7

**Safety (from earthquake & landslide)**: 47

**Comfort**: 19

**Clean, healthy, & Neatly**: 9

**Quite**: 9

**Unique & simple**: 5

**Having House Post Earthquake**: 1

**Good kitchen & for Gardening**: 1

**Good Water facilities & close to MCK**: 12

**Close to rice field & stockyard (kandang)**: 2

**Close to work place/school**: 2

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**Close to work place/school**: 5

**Accessible/Reachable**: 2

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**More thoroughfare (rama) & more Tourists**: 2

**Not interviewed**: 7

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According to the respondents, the four most significant priorities were to add (a) canopy/veranda/“teras”, (b) a new kitchen outside of the dome, (c) eaves (konsol/tritisan), and (d) a garage for a vehicle. The desire to add a canopy or eaves indicates that the domes lack protection against rain at their openings (related to the tropical climate). The desire for a new kitchen to be added outside of the dome was related to an aspect of cooking culture that favors cooking in a “dirty kitchen” (dapur kotor) over a “clean kitchen” inside the dome. The desire for a garage shows that residents would like to have some amenities befitting their social status that go beyond the basic and essential need for post-earthquake shelter.

Second and Third Evaluations: Improvements Made by Residents

Evaluations were also conducted in August 2008 and February 2009 to observe the physical changes that had been made to the domes, either in terms of items being attached or removed. The results showed a significant change from 2007-2008 with regard to elements attached to the dome, specifically the addition of eaves (tritisan). Eaves had been installed at most of the openings (doors/windows) of many of the domes. This shows how the inhabitants addressed the problem of rainwater seepage through openings, a problem that had been raised by UGM to the DFTW during the initial discussions regarding tropical architectural issues. The inhabitants tried to create their own eaves at first, but later received some support from DFTW for their efforts. DFTW support was only provided after it received the results of the second evaluation conducted in 2008. Community efforts to solve dome-related problems continued into 2009, though not to the same extent as in 2008 (see Figure 3.21).
Around 50-60% of families have built additions onto their domes. The rooms added are used as storage areas, garages, bathrooms, washrooms, and clothes drying rooms, but “dirty” kitchens have been the most popular addition. Many of the kitchens that have been added are in the form of an emplek-emplek (a porch-like structure) at the rear door, connected to the existing “clean” kitchen inside the dome. The emplek-emplek structure, which is a temporary structure made of bamboo, highlighted the families’ urgent need for a dirty kitchen even on a low budget. This emplek-emplek phenomenon should be given serious consideration before it leads to a slum-like housing landscape in the future.

The interviews and evaluation results indicate that the post-earthquake Ngelepen relocation project using imported dome homes has been well received and appreciated by the beneficiaries of the homes, with both the dome houses and the relocation site offering a better living environment for villagers. However, four months after living in the domes, residents identified several weaknesses in the dome house, and indicated their intent to address those problems. After two years, the dome homes had been upgraded to address the two most significant needs. The first was related to the need to protect openings from rainwater (a factor of the tropical climate), while the second was related to an aspect of cooking culture known as the “dapur kotor,” especially the use of wood fires for cooking (a factor of local culture). However, changes should be guided in such a way as to avoid the development of a slum-like environment due to the addition of emplek-empleks.
Lessons Learned

International solidarity is becoming part of the global culture in disaster relief and “the introduction of cultural imports” is unavoidable. It is essential that international agencies work with local partners when trying to offer solutions, and that they carefully consider the issues raised by those partners regarding project implementation.

The domes of Ngelepen are viewed as offering a better living environment for residents now that they have been adapted by the community to their needs. The residents of New Ngelepen, who are survivors of the 2006 landslide caused by the Yogyakarta Earthquake, were capable of adopting this new cultural element and adapting it to their own needs. This project is an important source of information on how people localize new cultural elements and accept them as their own. However, efforts to provide domes to other places should take into consideration the capacity of beneficiaries to cope with such cultural imports.

The synergy between the international agencies that provide cultural imports, the local governments where projects are to be implemented, and the local universities that can serve as partners in identifying problems and solutions prior to or during project implementation should be taken into consideration. The most important factor is the beneficiaries’ or survivors’ attitudes, that is, whether they are resistant to or welcoming of the project. The dome project in New Ngelepen was welcomed by
the community from the beginning, and as a result the community was ready to face the challenges presented by the introduction of the domes and to adapt the domes to their situation.

Concluding Remarks
The disasters that have the most devastating impact on society are usually a good place for the growth of international solidarity. International solidarity and support involving cultural imports cannot be avoided during disaster response activities. The key to the successful adaptation of cultural imports is the role played by the communities that are directly affected.

CASE 3.1.3. Small Industry Revitalization Program in Kotagede

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Introduction
Improving the quality of Kotagede’s Heritage District after the earthquake is not only about the “physical reconstruction” of tangible cultural heritage artifacts, but also of intangible heritage. The intangible cultural heritage of Kotagede Heritage District range from the production of traditional food (kipo, legomono, etc.) and clothes (sulam), to craft making (gold, silver, cooper, etc.), from having asset of community group maintaining traditional gamelan music to one practicing more popular folk keroncong, and from maintaining the tradition of Javanese poetry reading (mocopat) to spreading the tradition of Qur’an reading (pengajian, iqra). Of all the forms of intangible cultural heritage, the craft home industry sustained the most severe economic impacts as a result of the earthquake. No orders-no buyers means no income for families struggling to survive after the earthquake. How can we provide support to sustain the economic lives of artisan families? If the traditional home reconstruction efforts have emphasized the regeneration of physical properties, efforts to promote the economic revitalization of silversmith families in particular have been developed to sustain the intangible assets of Kotagede. The aim of conserving both the intangible and tangible cultural aspects of Kotagede’s valuable heritage requires recognition of the importance of the sustainability of those assets for the community. The concept of sustainability recognizes that cultural diversity is an essential component of cultural identity, as is a sense of community belonging, social inclusion, and participation (Rodwell, 2007, p. 185). Thus, to improve the sense of community belonging, social inclusion, and cultural identity, Gadjah Mada University and its partner Exxon Mobil developed a program called the Post-Earthquake Revitalization of Kotagede Crafts.

The Focus, Target, and Period of Program Implementation
This program focused on how to support the low-income silversmithing families that were victims of the earthquake. Out of the estimated among 178, around 100 silversmith are low-income families and fully relying on the craft making. 50 target beneficiaries were organized. The program introduced the “Program Oder Produk Unggulan Kerajinan Perak”—the Qualified Silver Craft Product Order. The program was essentially a product-based ordering system in which selected silversmith, who has some background in market based products. The objectives of this specific program were:

1. To motivate low-income silversmiths to solve their own economic problems after the earthquake by working on an “order-based program”
2. To introduce a collaborative program simulating the relationship between “customer and craft worker” to improve the quality of silver craft products.
3. To promote silver craft products resulting from the “order-based program” to a wider market either inside or beyond Kotagede.

The program was basically implemented for two years, from March 2007 to February 2009. However, the program should be sustained until the silversmith industry is restored to pre-quake or better levels of activity.

**Collaborative Works to Revive the Post-Earthquake Kotagede Silver Craft Industry**

The initiator and implementing organization of this program is Gadjah Mada University. It is supported by its key partner, US-based oil company Exxon Mobil. The program is locally supported by Lurah (Village Leader) of Jagalan, OPKP Kotagede (Organisasi Pelestari Kawasan Pusaka Kotagede), a local NGO for Kotagede Heritage District Preservation, and KP3Y (Koperasi Produksi Pengusaha Perak Yogyakarta), the Cooperative of Silver Works Producers in Yogyakarta. It is supported by Dinas Perindustrian DIY (Agency of Industry of Yogyakarta Province) at the provincial government level and with the National Agency for Export Development (BPEN, Badan Pengembangan Ekspor Nasional) at the national level.

**This program was implemented in two phases:**

1. Reviving small industries and promoting the best products of small industry through a partnership program

This activity is aims to seek possibilities for reviving the business of Kotagede silversmiths, specifically for small-scale workers who suffered financial losses after earthquake. The plan of program implementation is shown in the diagram below:

```
GMU Team

Verification of Craftsmen Properness
Profile of Craftsmen
Reviewer
Prototype Production
Prototype Review
Product Ordering
Product Profile and Leaflet
Product Marketing

OPKP Kotagede

Source: Internet, Books, Exhibitions

PHASE 1

Proposing the Candidates of Beneficiary

Product accepted by market
Product rejected by market

Outside Kotagede

Inside Kotagede

PHASE 2

PHASE 1 PHASE 2

Product accepted by market
Product rejected by market

PHASE 1

PHASE 2

Figure 3.23 The scheme for small industry reviving program

**Verification of Craftsmen Properness --> Verification of Craftsmen's Qualifications**

Overall, 53 silversmiths were observed, but only 40 were selected to be involved in this partnership program. They were selected based on a verification of their qualifications (also, some candidates stopped working as silversmiths after the earthquake). The objective of the preparation and elaboration of a prototype for silver craft design, the objective was to improve silversmiths’ skill levels, as well as to improve their silver craft design ‘vocabulary.’ The process of making a prototype was important because the result was indicative of the silversmith’s skills (capacities and capabilities, speed and quality of the finished product). The quality of the prototypes was reviewed by experts based on the design quality...
(art value, usefulness, market value, originality) and silversmithing skills (tidiness, design transformation, technical skill, and detailed design ability).

Moreover, during the process of program implementation some agreements were reached regarding such issues as the role of OPKP in stabilizing the raw material price of silver by supplying the commodity, the development and sustainability of the partnership program, as well as UGM’s commitment to support product marketing. The production of prototype was based on recommended designs and the silversmiths’ expertise. Each silversmith received orders valued at about Rp. 2,000,000.00 – Rp. 2,500,000.00. All of the resulting products have been included in the catalogue of Kotagede silver craft products, which contains pictures, names or titles of products, product specifications (weight, materials), designer and silversmith names, as well as product prices. This catalogue has helped considerably with product promotion and marketing.

Figure 3.24 Partnership program selection process

2. Marketing and promoting the best products of small industry

Small-scale craftsmen in Kotagede have limited access to opportunities to promote and market their products. In this phase, the team from UGM and OPKP Kotagede collaborated on several activities aimed at marketing the products, including providing a space to be used as a collective showroom as well as participating in national and international exhibitions. The first step in the development of a collective showroom was for Omah UGM to serve as a collective showroom and gallery for Kotagede silver crafts. Several alternative locations were also to be developed as collective showrooms in Kotagede, including Omah Loring Pasar (OPKP office) and Babon Aniem (a Kotagede landmark).
To develop a reputation more broadly, Kotagede silver crafts should be marketed outside Kotagede. For this reason, silver craft products resulting from the partnership program were marketed in some outlets outside Kotagede as well as via an Internet website (http://kotagedecrafts.multiply.com). Some Kotagede craftsmen, specifically the silversmiths participating in the partnership program, have attended various national and international exhibitions. These events include TexCraft Exhibition 2008 in Yogyakarta, JA New York Summer Show 2008 in New York (as part of a booth highlighting Indonesia), Surabaya International Jewelry Festival 2008 in Surabaya, Jogja Export Expo 2008 in Yogyakarta, and the Indonesia Jewel Expo 2008 in Jakarta. As a result, there were several transactions between representatives of the Kotagede silversmiths and potential national and international buyers.

Based on these achievements, there are several challenges to be addressed. Efforts must be made to improve the uniqueness and quality of design in order to compete with other products, and to strengthen product promotional efforts in Kotagede and beyond by providing and preparing locations for collective showrooms.

**Lessons Learned**

Overall, this program has made significant contributions to the economic revival of this small industry. The community appreciated the support provided by UGM and Exxon Mobil. The partnership program has been implemented for about two years and has had a positive impact on local silversmiths. They have been able to improve their skills, expand their design vocabulary, broaden their knowledge of marketing and promotion, and finally to recover from their financial losses after the earthquake. For the OPKP team, this program can serve as a practical exercise in managerial and local program development. To encourage the sustainability of the program, the OPKP team should develop possibilities for future activities. For the UGM team, this program has provided a way for the academic community to get involved in community service. It also served as an exercise in effective funding management that will benefit other community economic revival efforts even when the funding for this program has ended.
3.2 Livelihood

Prof. Ir. Bakti Setiawan

Pre Disaster Conditions in the Region

As a region with a high population concentration and limited natural resources, Yogyakarta faced livelihood problems even before its 2006 earthquake disaster. According to the National Statistic Bureau, around 17% people in this region were considered to be poor. Data from BPS in 2005 indicated that 625,800 people were considered to be living below the poverty line. In terms of PDRB (gross regional domestic product) per capita, data from 2005 shows that Bantul was considered to have the lowest in the province at only Rp 3,747,763 per capita per year, as compared to the average of Rp 5,057,608 in Yogyakarta Province.

One of the regencies hardest hit by the earthquake, Bantul was already facing the pressures of poverty. Of the five regencies and city in this province, Bantul was considered to be the second poorest regency after Gunung Kidul, the dry, mountainous area in the southern part of Yogyakarta.

The fact that the region had already been facing a livelihood problem is also indicated by the fact that most of the population is still engaged in sub-system agricultural activities, with limited land and simple technological inputs. In 2005, for example, 40% of the population in this area was engaged in agriculture. However, this sector contributed only 18.34% of the total PDRB in this region, highlighting the low productivity of the agricultural sector.

Of course, there has been a shift from agriculture to non-agricultural sectors including services and industry. This shift is important in terms of helping people develop livelihoods, but it not enough to solve the problem altogether. In brief, it is very important to remember that most people in the disaster-stricken areas were already facing livelihood problems before the earthquake. Any discussions regarding the impact of the earthquake, recovery strategy, recovery status, and challenges for the future must consider this important fact.

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Before the Earthquake</th>
<th>After the Earthquake</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Poverty Gap Index</td>
<td>3.59 (by July 2005)</td>
<td>3.80 (by March 2007)</td>
<td></td>
</tr>
<tr>
<td>2) Distribution-Sensitive Index</td>
<td>1.02</td>
<td>1.12</td>
<td>BPS DIY No. 16/08/34/Th. IX. 2007</td>
</tr>
<tr>
<td>3) Poverty rate in Yogyakarta Province</td>
<td>625,800</td>
<td>633,400</td>
<td>BPS, 2008 Based on Susenas 2007</td>
</tr>
</tbody>
</table>

Post Disaster Conditions

As can be imagined, the earthquake has caused extensive damage and losses for the people in the area. The livelihoods of thousands of families were highly vulnerable. Table 3.5 shows the impact of the earthquake with regard to several aspects of the economy and people’s livelihoods. According to Bappenas, the total damage and losses were valued at 29.2 trillion rupiah. The sector heaviest hit was the housing sector, followed by the economic sector.

<table>
<thead>
<tr>
<th>DLA</th>
<th>Funding Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>15.3</td>
</tr>
<tr>
<td>Social</td>
<td>4</td>
</tr>
<tr>
<td>Economy</td>
<td>9</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>0.6</td>
</tr>
<tr>
<td>Others</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29.2</strong></td>
</tr>
</tbody>
</table>

Sources: BPS, 2008, BPS DIY, 2007

Table 3.5 Damage and Loss Assessment (Rp trillion)

Sources: Source: Bappenas, 2006
Of the economic and production sectors, the industrial sector, particularly small and medium-sized businesses, sustained the highest level of damage and losses, followed by the agricultural sector. Table 3.6 shows that more than two-thirds of the total damage and losses, valued at least 7,708.20 trillion rupiah, were sustained by the industrial sector. In Yogyakarta and Central Java, a rough estimate indicated that 17,300 formal enterprises and 12,320 informal, small enterprises were affected by the earthquake. Such figures are significant as they result in indirect impacts to the livelihoods of about 2.5 million of people in the area.

Particularly in Bantul and Klaten, three small and medium-sized industries were badly affected by the earthquake: ceramics and handicrafts, furniture, and leather. In Bantul, for example, almost two-thirds of all industrial units (14,600 units) were badly damaged by the earthquake. While in Klaten, about 30% of all industrial units (7,900 units) were affected by the earthquake. It is also important to note that because of the earthquake, at least 85 traditional markets in the disaster area were destroyed. Such damage was significant since the traditional markets provide important basic facilities for the day-to-day local economy.

Table 3.6 Damage and Loss Assessment in the Production Sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Damage</th>
<th>Losses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Industry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Big</td>
<td>183.70</td>
<td>70.00</td>
<td>253.70</td>
</tr>
<tr>
<td>1.2 Small and Medium</td>
<td>3,879.20</td>
<td>3,829.00</td>
<td>7,708.20</td>
</tr>
<tr>
<td>Sub-total Industry</td>
<td>4,062.90</td>
<td>3,899.00</td>
<td>7,962.90</td>
</tr>
<tr>
<td>2. Trade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Traditional market</td>
<td>165.00</td>
<td>79.80</td>
<td>244.80</td>
</tr>
<tr>
<td>2.2 Modern market</td>
<td>18.70</td>
<td>39.80</td>
<td>58.50</td>
</tr>
<tr>
<td>Sub-total Trade</td>
<td>183.70</td>
<td>119.60</td>
<td>303.30</td>
</tr>
<tr>
<td>3. Tourism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Agriculture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1 Infrastructure</td>
<td>44.00</td>
<td>-</td>
<td>44.00</td>
</tr>
<tr>
<td>4.2 Production loss</td>
<td>-</td>
<td>638.40</td>
<td>638.40</td>
</tr>
<tr>
<td>4.3 Livestock</td>
<td>2.70</td>
<td>0.10</td>
<td>2.80</td>
</tr>
<tr>
<td>4.4 Agricultural tools</td>
<td>0.10</td>
<td>-</td>
<td>0.10</td>
</tr>
<tr>
<td>4.5 Public building</td>
<td>4.00</td>
<td>-</td>
<td>4.00</td>
</tr>
<tr>
<td>Sub-total Agriculture</td>
<td>50.80</td>
<td>638.50</td>
<td>689.30</td>
</tr>
<tr>
<td>5. Fisheries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1 Fishery landing</td>
<td>0.10</td>
<td>-</td>
<td>0.10</td>
</tr>
<tr>
<td>5.2 Fish ponds</td>
<td>13.20</td>
<td>1.40</td>
<td>14.40</td>
</tr>
<tr>
<td>5.3 Public facilities</td>
<td>1.40</td>
<td>-</td>
<td>1.40</td>
</tr>
<tr>
<td>Sub-total Fisheries</td>
<td>14.70</td>
<td>1.40</td>
<td>16.10</td>
</tr>
<tr>
<td>Total for All Production Sectors</td>
<td>4,346.30</td>
<td>4,676.40</td>
<td>9,024.70</td>
</tr>
<tr>
<td>Total Damage</td>
<td>22,750.70</td>
<td>6,398.30</td>
<td>29,149.00</td>
</tr>
</tbody>
</table>

Source: TTN, 2008

Initial Needs and Priorities

Since the beginning, particularly during the early response phase, the earthquake response focused on meeting the basic needs of victims for shelter (tents), food, and water. The government and society at large provided for such basic needs in the very early days of the disaster. In addition to water, there were distributions of foods such as rice, instant noodles, and other snacks. Tents were also distributed to be used as temporary shelter by those whose houses had been destroyed. Such response measures ended in July 2006, two months after the earthquake.

After July 2006, a rehabilitation program for the economic sector was discussed and initiated, but no real movement was made in this area since the people and government were still concentrating on a housing rehabilitation and reconstruction program. In 2007, a recovery effort for the economic sector was developed and disseminated, as assistance funding had begun to be distributed. It is also important to note that the housing reconstruction program directly helped the local economy as it created significant job opportunities in the area. In Bantul, for example, the level of unemployment in 2007
(while the housing reconstruction program was underway) was only 9.7%, as compared with the first part of 2006 when it was about 14.87%. Such figures indicate that the housing reconstruction program made a significant contribution to the local economy and the livelihoods of local people.

Framework for Recovery

As mentioned previously, the initial recovery program in the disaster area was mainly focused on housing reconstruction, including the reconstruction of such basic public facilities as roads, schools, health centers, and traditional markets. Efforts to directly restore the local economy were relatively weak or neglected. This was the case particularly during 2006 and the first part of 2007. In May 2007, however, one year after the earthquake, the government and people realized that more efforts and attention needed to be paid to directly promoting an economic recovery, particularly in the small and medium-sized industries.

Starting in the second half of 2007, several recovery programs were launched to help boost the local economy. Table 3.7 lists several of these, starting with a credit program directed specifically toward small and medium-sized enterprises. Table 3.7 shows that the recovery program for the local economy was quite comprehensive and significant. However, such a comprehensive program should be critically evaluated since not all aspects had significant positive impacts on the livelihood of people living in the disaster-stricken areas.

Table 3.7 Recovery Programs for the Local Economy

<table>
<thead>
<tr>
<th>No.</th>
<th>Program</th>
<th>Institution Involved</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Policy/regulation on credit restructuring (No. 8/10/PBI/2006)</td>
<td>Bank of Indonesia</td>
<td>17,712 debentures were restructured, for a total credit market of 375 billion rupiah</td>
</tr>
<tr>
<td>2</td>
<td>Support program for BPR (Community Credit Bank)</td>
<td>GTZ and local governments</td>
<td>40 BPR in Yogyakarta and 13 BPR in Central Java; Total support EUR 500,000/ USD 9.85 million in the form of credit and partnership programs; Capacity building program in the form of trainings.</td>
</tr>
<tr>
<td>3</td>
<td>Reconstruction program for economic facilities and infrastructure</td>
<td>Central and local government</td>
<td>Traditional market reconstruction, irrigation systems, road improvements</td>
</tr>
<tr>
<td>4</td>
<td>Small and medium-sized enterprises recovery program</td>
<td>Central and local government</td>
<td>Rp 105,60 billion in 2006; Rp 332,911 billion in 2007 and 2008 (APBN and APBD/central and local government budget/spending)</td>
</tr>
<tr>
<td>5</td>
<td>Financial and technical assistance for SMEs</td>
<td>IOM</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Recovery program directed to improve the market networks</td>
<td>Office for Industry and Trade</td>
<td>Using APBN and APBD (central and local government funds) to help micro-enterprises to maintain their networks with buyers</td>
</tr>
<tr>
<td>7</td>
<td>Direct advocacy and empowerment programs for micro-enterprises</td>
<td>Many donors, universities, and local NGOs</td>
<td>See examples in the case studies on the livelihood sector (Kasongan, Kotagede, Imogiri)</td>
</tr>
</tbody>
</table>

Sources: TTN 2008; GTZ 2008; JRF 2008

Progress and Current Status

As can be expected, several significant signs of progress could be seen in the second year after the earthquake. Progress was evident from both macro and micro economic indicators. Economic growth was significantly reduced by the earthquake. As shown in Table 3.8, the economic indicators changed significantly before, during, and after the recovery program. In Yogyakarta, economic growth was able to return to a 5% level of growth in 2008, about two years after the earthquake. There is no data on Central Java, but it is reasonable to estimate that the economic growth in this province did not change significantly as a result of the earthquake.
Table 3.8 Economic Growth in Yogyakarta and Central Java

<table>
<thead>
<tr>
<th>Region</th>
<th>2005 (before the earthquake)</th>
<th>2006 (early recovery)</th>
<th>2007 (recovery)</th>
<th>2008 (recovery)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yogyakarta</td>
<td>5%</td>
<td>3.69%</td>
<td>4.2%</td>
<td>5%</td>
</tr>
<tr>
<td>Central Java</td>
<td>5.35%</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

In terms of job opportunities, Table 3.9 shows that there have been some significant changes in people’s occupations and joblessness. It is not surprising to see that during the reconstruction process, particularly in 2007, many people were involved in the construction sector. Such data prove that the housing reconstruction process did create job opportunities for people in the area and this was a positive development for the livelihood of the victims. However, such job opportunities still cannot make up for the negative impact of the earthquake on people’s livelihoods. Table 3.9 shows that the level of joblessness in the area remained high in 2008, at about 9.74%. Such figures still represent an improvement, however, given that the unemployment rate was 14.87% in 2007.

Table 3.9 Distribution of Occupations and Joblessness in Bantul Before, During, and After the Reconstruction Period

<table>
<thead>
<tr>
<th>Sector</th>
<th>Before the Earthquake</th>
<th>During Reconstruction</th>
<th>After Reconstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>35.13</td>
<td>27.44</td>
<td>35.13</td>
</tr>
<tr>
<td>Mining</td>
<td>0.51</td>
<td>0.51</td>
<td>0.51</td>
</tr>
<tr>
<td>Industry</td>
<td>11.03</td>
<td>4.62</td>
<td>11.79</td>
</tr>
<tr>
<td>Electricity and Water</td>
<td>0.26</td>
<td>0.26</td>
<td>0.26</td>
</tr>
<tr>
<td>Building</td>
<td>19.23</td>
<td>29.49</td>
<td>16.41</td>
</tr>
<tr>
<td>Trade and Tourism</td>
<td>11.28</td>
<td>8.46</td>
<td>10.51</td>
</tr>
<tr>
<td>Transportation and Telecommunication</td>
<td>4.62</td>
<td>3.33</td>
<td>3.85</td>
</tr>
<tr>
<td>Services</td>
<td>12.06</td>
<td>10.51</td>
<td>11.79</td>
</tr>
<tr>
<td>Jobless</td>
<td>5.90</td>
<td>14.87</td>
<td>9.74</td>
</tr>
</tbody>
</table>

Source: TTN, 2008

Figure 3.26 shows another aspect of micro-enterprises in the area. A survey conducted by TTN in 2008 shows that 42% of respondents thought that sales had fallen after the earthquake, with 40% indicating no change and 18% indicating an improvement in sales after the earthquake. Such data indicates that the large number of micro-enterprises in the region had a significantly negative impact on the overall economy in the region. Another set of data from the same source (TTN, 2008) also indicates that in late 2007, the level of economic recovery had reached about 40 to 60% of pre-quake levels, clearly indicating that this issue still needs to be addressed.

Figure 3.26 Respondents’ Perceptions of the Sales of Micro-Enterprises Before and After the Earthquake (Source: TTN, 2008)
Challenges and Advantages

Although the economic recovery has progressed quite well in the disaster area, several challenges remain. Not all of these were caused by the earthquake itself, but by structural problems embedded in the local economy, particularly among small and medium-sized enterprises. Problems include insufficient market networks, lack of access to credit, and inadequate technical know-how.

A survey conducted by TTN in 2008 (Figure 3.27) revealed that after the recovery, people in Bantul faced several constraints in finding a job. The biggest constraint was access to credit (28%), followed by access to education (22%). This suggests that the people of Bantul continued to face the embedded problem of finding work.

![Figure 3.27 Perceptions of Constraints Faced in Finding Work (Bantul)](image)

Source: TTN, 2008

Figure 3.28 shows another important aspect of the livelihood issues in Bantul. When asked about their expectations for improving their livelihood, 51% of respondents thought that what they needed most was access to capital, while 23% thought that improving their skills was most important. Others indicated that production tools were most important (11%), as well access to raw materials (5%) and marketing (5%). This suggests that people in the area still face many structural problems in improving their livelihood.

![Figure 3.28 People's Expectations for Improving Their Livelihoods (Source: TTN, 2008)](image)
Lessons Learned

Drawing from the experiences documented above, five important points related to livelihood can be drawn:

1. Even before the earthquake, most victims were already suffering from livelihood problems. Some of them were already economically vulnerable and struggled to survive in an environment with limited natural resources. Under such conditions, their ability to cope with any unexpected changes and shocks, including the earthquake, were very low.

2. Although local communities themselves were able to initially respond to the most basic initial needs of the victims, support and help from the local government, national government, and international communities were needed. Their effective and rapid response measures were very useful in helping the victims cope with the uncertainty of the situation.

3. During the first phase of the reconstruction phase, livelihood programs were thought to be somewhat neglected, since many resources were directed toward physical housing reconstruction. In addition, many livelihood programs tended not to be prepared from a comprehensive, long-term perspective, and thus were unable to bring any sense of long-term resilience to the community, and particularly the earthquake victims.

4. More comprehensive and long-term livelihood programs need to be implemented to help the community and to help the most vulnerable groups develop more strength for dealing with unexpected changes.

5. Those who are involved in non-agriculture sectors, such as the home industry and services, have more complex livelihoods, and therefore need more comprehensive approaches and strategies.

CASE 3.2.1. Efficient Kiln Model to Support Economic Reconstruction in Kasongan

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Introduction

Kasongan was one of the areas in Bantul that was destroyed by the 2006 Yogyakarta earthquake. Located about seven kilometers south of Yogyakarta, it consists of several dusuns (like kampong): Kajen, Gedongan, Tirto, and Sembungan. Kasongan has long been known for its handmade terracotta pottery. The business began to grow rapidly in the 1990s and now the pottery can be found in many countries throughout the world. Almost all of the people in Kasongan are pottery craftsmen and business owners, whose economic lives depend on the production process and production facilities. Almost half of the buildings in this area were involved in pottery production, and many of them were destroyed by the earthquake. This immediately paralyzed the economic cycle of the entire village. The data on building destruction by function, shown below, was obtained from an assessment carried out by UGM, funded by JICA.
Craftsmen rely on production facilities to mass produce pottery. One of their most important pieces of equipment is the kiln, which is a huge wood burning oven used to heat and harden the pottery. Of the area’s 112 kilns, only 33% were able to be restored to usable condition after the earthquake with only minor repairs. People struggled to rebuild their kilns even before their houses after the quake, indicating just how important the kilns are in the production cycle, and the importance of their role in generating income and facilitating local recovery.

The local government read this situation well and constructed kilns throughout the village to facilitate some economic continuity. The kilns constructed were made using the same basic technologies that the craftsmen were familiar with, but unfortunately they were of very poor quality and thus were unusable. What had looked like a promising initiative failed to achieve its goals. The kilns were so useless that they were actually dismantled: local residents stacked up the bricks and other materials so that the land could be put to better use. Some even planned to build new kilns themselves using the material left from those provided by the government. Regardless of who is to blame for this poorly executed project, the situation at least left people with the materials they needed to build the their own kilns. In fact, it offered an opportunity to make better models than those that had been built before the earthquake, and thus to improve several of the older models’ weaknesses in efficiency and pollution. The firing process uses a huge amount of wood, which is getting more and more expensive by the day. The
pollution created by the firing kilns is also reducing the air quality and causing health issues, as the kilns are typically located next to homes, and are distributed throughout residential areas.

Related to the restoration process, increasing kiln efficiency also means increasing the income of craftsmen, and speeding up the recovery of the village through participatory development. After looking at the local needs and the opportunities available, a decision was made to implement a program to design a more efficient kiln that could be built by the craftsmen themselves and to promote its use throughout the village. The second priority was to make it a more environmentally friendly kiln and thus, if possible, to improve the air quality around dwelling and working spaces.

*Project Description*

This program was carried out almost a year after the earthquake (February-August 2007), as the next step of the revitalization process. Its goal was to design a more efficient kiln, and to promote its use throughout the village. The kiln had to be easy to make (with local materials) and easy to use. To make a significant difference, it would have to be at least 20% more efficient than previously used kilns. Efforts would also have to be made to try to reduce the air pollution caused by the firing process. The social aspects of kiln management, such as how to give craftsmen access to public kilns until they were able to make their own, and how kilns should be publicly managed, were also of concern. This was identified as a secondary target of this program.

JICA was the main donor of this program's 55 million rupiahs, most of which was used for the construction of three kilns and experimental equipment. As the academic institution implementing the program (experiments, surveys, etc.), UGM assigned two students from the architecture department, and four students from the physics department to participate. Lecturers from both departments assisted with the experiment. Gesang Ceramic was the local partner organization that JICA worked with closely throughout this program. Gesang Ceramic was chosen as a partner because it was a corporation of craftsmen that had a network throughout the village, thus providing easier access to the data, labor, or other resources needed for conducting the experiments. The head of the corporation was also very interested in development, and his support was expected to be an important factor in promoting the use of the new model going forward. Throughout the program UGM tried to work closely with the government’s technical support team for the craftsmen (Unit Pelayanan Teknis), so they would be fully aware of the process and could help promote the use of the new kiln model. The local government (Dukuh, head of sub-village) acted more passively, only giving permission for UGM to carry out the program.

*Review and Evaluation*

The following steps were taken to implement this program:

1. **Survey:** We managed to assess 68 kilns throughout Kasongan for physical and behavioral data, including the materials used, the size and variety of ceramics placed in the kiln, durability, construction, complaints, etc.
2. **Analysis:** The research team designed several new model alternatives, and selected three for full-scale testing.

3. **Testing:** We built the kilns and tested them against the original models used in Kasongan in terms of heat and fuel consumption.

4. **Promotion:** Based on the results of the experiment, we proposed a new kiln design and presented it to the public. The presentation was carried out in the government’s technical support building (UPT). We invited several key people in the village to participate in a formal presentation and asked them to bring other craftsmen from their group or area. We also handed out pamphlets about the new model to be distributed to other craftsmen.

5. **Assistance:** After the formal presentation, we helped Gesang Ceramic plan for the management of the kilns that had been built so that members of the corporation could use them on a rotating basis. We also conducted follow-up surveys to determine how the kilns were being used, the significance of the efficiency improvements, and their effects in the actual production process.

Tests showed that the modified kiln could be made to be more efficient and stronger, just by adopting slight changes in construction details and materials. The data showed that the new model required the use of 1m³ less firewood, a 20% reduction, and also reduced the firing time by three hours, to 15 hours. Craftsmen could easily use the modified model since it was not too different from the old model. Thus, we technically achieved the goal of making a more efficient kiln. The tests also showed that better air quality was achieved by eliminating the use of straw in isolating the upper part of the kiln that turns into ash. The ash is usually spread by the wind to surrounding areas, making it hard to breathe.
The promotion of the results throughout the community, though in some ways the most important part of the program, did not work as expected. Only about half of the 17 people invited came to hear the presentation, and few seemed interested based on an observation of the discussion and questions asked. Among the few most interested was the head of Gesang Ceramic, who actually helped explain how the kiln works, and invited people to come to the kiln to learn more about it. This initiative by a local craftsman showed that there was still hope that the results of the experiment might be spread by way of craftsmen who were interested in and aware of the results themselves. One month of assistance by Gesang Ceramic yielded good results. The corporation easily managed to build a coordination system among its 35 members, so they could be shown one at a time how to use the new kiln.

Lessons Learned

Even though the experiment showed good measureable outcomes, some craftsmen say that not much has changed. An inquiry into the source of problem revealed that each craftsman has his own style and burning techniques. Very few measures the precise amount of wood and time used in the firing process. There is also the matter of how dry the fire wood is, as dryer wood means quicker firing. These variables make it hard for ordinary craftsmen to actually see significant effects of the new design. They also do not yet see the new model as an environmental solution for improving air quality, perhaps due to ignorance of the issue or a lack of understanding.

Getting people to accept new developments in small villages is not as easy as in modern society. Most people are reluctant to accept new methods of doing things, even if they believe they have value. Changing people’s attitudes requires a great deal of effort, cooperation, and time. Hopefully these efforts will continue to be carried out in Kasongan by the local technical support system and craftsmen interested in the new kiln model, such as the members of Gesang Ceramic. Several lessons were learned over the course of this project:

1. Working side-by-side with a local group proved useful for gathering information and carrying out experiments throughout the program, especially in publicizing the results.
2. Convincing people about the benefits of a new technology is often harder when the people are not comparing the old to the new using appropriate measures. In this case, some people did not notice the factors that affect the amount of wood used or the amount of firing time required. We had to explain the entire firing process, not just the new technology. Do not assume that people completely understand what they are doing just because they have been doing it for a long time.
3. Teaching people new technologies and hoping they will adopt them is a long intensive process, and it may be best just to actually give the people the items they need. In this case, it would have been better for the government to have coordinated with the university before actually building the kilns for the village. This way, all the new kilns would been made to be more efficient and people would have been forced to learn how to use, repair, and rebuild them.
4. The local government had a good idea, but lacked the operational expertise. Thus, the result was very unsatisfactory.

Concluding Remarks

1. Work as closely as possible with local groups to identify problems and find realistic ways to solve them. The members of local groups already have relationships with one another, and this makes it easier to coordinate activities and influence a wider audience.
2. New technologies are not always easily accepted. Thus, after the program has ended, hopefully some of the people with an interest in the technologies will continue to spread the word about them, person-to-person. Target the people, who are most interested.
3. For new technology to make a significant difference and to boost economic revitalization, it might as well be adopted on a large scale.
CASE 3.2.2. Community Participatory Program in Building Reconstruction of Kasongan

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Description of the Program

Reconstruction and recovery activities were carried out in order to rebuild the work areas of Kasongan. To accelerate the process, individual and institutional donors from national and international organizations provided support for reconstruction and recovery efforts in the devastated region. Previous experience shows that most of the donors supported the victim massive physical buildings. These might often unsuitable because the buildings did not accommodate the specific activities of the people that relate to economic, social, and cultural aspects. To have a better reconstruction and recovery system, suggestion to utilize such space layout or local architecture elements on the buildings that the people were familiar with their new houses was raised. However, in some cases people felt awkward to receive the houses. A new delivery system should be created to solve the cases.

The first donation for a housing reconstruction program for the people of Kasongan came immediately after the disaster from the government of Bengkulu. The province of Bengkulu is also in an earthquake-vulnerable area and this encouraged the government to provide financial support to the people of Kasongan for rebuilding their damaged houses. A total of Rp. 400,000,000 was donated to rebuild 40 of the houses most in need of reconstruction, that is, those of needy people whose houses were totally destroyed. Of course, more than 40 houses were needed and action had to be taken to solve this dilemma. The community held a meeting to determine a fair way to distribute the donated funds. They decided to build core houses by utilizing the funds to purchase construction materials and rebuilding the damaged houses themselves.

Another problem was the lack of manpower available, since rebuilding a home requires the labor of both the homeowner and his neighbors. Groups of five to seven families were formed to solve the problem. Each group worked together to rebuild one another's houses, one at a time. First priority was given to families with inappropriate shelter and families with senior members or children under five.

The process included many participants as described in the table 3.10 below.

<table>
<thead>
<tr>
<th>Activities</th>
<th>Local Community</th>
<th>External Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networking to get funding</td>
<td>National networking by spokespersons from the community</td>
<td>Government of Bengkulu</td>
</tr>
<tr>
<td>Funding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reconstruction planning</td>
<td>Discussion by a group of spokespersons and scholars</td>
<td></td>
</tr>
<tr>
<td>Housing design</td>
<td>Collaborative action between scholars (serving as designers) and the local community</td>
<td></td>
</tr>
<tr>
<td>Implementation planning</td>
<td>Discussion about the schedule of implementation by local community</td>
<td></td>
</tr>
<tr>
<td>Implementation/reconstruction</td>
<td>Reconstruction of housing by local community and external workers</td>
<td></td>
</tr>
<tr>
<td>Post reconstruction</td>
<td>Completion and expansion of core houses by individuals</td>
<td></td>
</tr>
</tbody>
</table>

Evaluation of the Program

This participation process was viable because the victims were highly motivated to recover from the earthquake. Initiator may be motivated the same objectives, interests, actions, or solidarities as the communities. Community participation should be encouraged when it is well suited to the background of
the community concerned, since the willingness and spontaneity of the community are major factors in the success of such activities (Sumarto, 2003).

In general, people may participate in such activities as the preparation of policies and planning, implementation, and monitoring and evaluation. Participation should be promoted at every stage of the social system cycle (Sumarto, 2003). Every person in Kasongan participated in one or more parts of the reconstruction process, based on his or her skills. The survey indicates that the people participated primarily by sharing work (gotong-royong).

Reconstruction efforts through community participation were successful. A representative of a group would serve as leader in proposing a fund, communicating, and coordinating with the related local government. Another person would serve as a community meeting coordinator. Fagence (1977) asserted that the community participation process requires two skilled staff members to encourage the people during the planning and implementation processes. The first staff performs public relation activities, while the second conducts activities requiring technical and political competences.

The earthquake victims suffered traumatic experiences that will be hard to overcome. They need healing from this trauma. Community participation can be a source of healing when people are taken from a situation, wherein subordination is given high priority (Soetrisno, 1995).

The achievement of the objective strongly depends on the community’s response to the participation process. The degree of satisfaction reported indicates the success of this participatory process (see Table 3.11).

### Table 3.11 Evaluation of each stage of participation

<table>
<thead>
<tr>
<th>Stage</th>
<th>Score (1 – 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socialization/Communication</td>
<td>4.26</td>
</tr>
<tr>
<td>Material purchasing</td>
<td>3.93</td>
</tr>
<tr>
<td>Implementation (“gotong-royong”)</td>
<td>4.26</td>
</tr>
</tbody>
</table>

**Community Response to New Buildings**

Survey results show that the recipient community responded favorably to the condition of the reconstructed buildings. This is indicated by higher evaluation post-quake scores as compared with pre-quake scores.

### Table 3.12 Building Evaluations by Community Members

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Average Score</th>
<th>Pre-quake</th>
<th>Post-quake</th>
<th>Percent increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong structure</td>
<td>2.60</td>
<td>4.17</td>
<td>1.57</td>
<td></td>
</tr>
<tr>
<td>Aesthetic</td>
<td>2.76</td>
<td>3.85</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>Floor area</td>
<td>3.19</td>
<td>3.59</td>
<td>0.41</td>
<td></td>
</tr>
<tr>
<td>Functional</td>
<td>3.03</td>
<td>3.63</td>
<td>0.61</td>
<td></td>
</tr>
<tr>
<td>Natural light</td>
<td>3.19</td>
<td>3.86</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>Air flow</td>
<td>3.10</td>
<td>3.85</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td>Comfort</td>
<td>3.12</td>
<td>3.85</td>
<td>0.73</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

a. Number of respondents: 44
b. Score range: 1 – 5 (1 = very bad, 5 = very good)

Table 3.12 shows that the pre-earthquake average score was 2.60 – 3.19. A strong structure was the most important factor. The owners were confident in the structure because they participated in the planning and implementation of core house reconstruction.
After the reconstruction process, the owner expanded the core houses in many forms depend on their needs. The design of the core houses offered the opportunity to do that. Figure 3.35 shows photos of the new core houses.

Lessons Learned

1. Community participation during the entire reconstruction process, from planning to completion, is very important to ensure that the houses meet residents' needs for their own living space.
2. The leadership of spokespersons or local leaders are also required for the implementation of participatory planning and design.
3. The role of experts, in these case scholars, is valuable to give an academic perspective to the program.

Efforts were successful when the new buildings were appropriate to their purpose and a suitable living environment was created.

CASE 3.2.3. Redesign of Bangsal Trajumas Kraton Yogyakarta

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Historical Background and Philosophy

Bangsal Trajumas is an important building in the Yogyakarta Palace complex. Located in the Sri Manganti yard, close to Bangsal Sri Manganti. Bangsal Trajumas was built by Sri Sultan Hamengku Buwono I in 1769, 13 years after Sri Sultan Hamengku Buwono I began residing at Yogyakarta Palace on 7 October 1756. Some have suggested that Yogyakarta Palace was built over time by Sri Sultan Hamengku Buwono I, in consideration of the function and importance of the buildings.

Trajumas comes from word Traju, which means “timbangan” (scales), and implies the concept of fairness, such that one side does not have an unfair advantage over another. Meanwhile, the word mas (emas or gold) means something noble and good. Together the name refers to the execution of justice based on idealism, high commitment, and moral integrity.

The symbolic and philosophical meaning of Bangsal Trajumas is that “a leader (in this case, the Sultan) must make decisions based on justice and truth, ignoring their self-interest, including their own family and other worldly interests”.

Figure 3.35 New core houses, 2008
Bangsal TrajumasUsage

During the era of Sri Sultan Hamengku Buwono VI (1855-1877), Bangsal Trajumas was used as a school known as Sekolah Sri Manganti. It was attended by people of high social status, primarily the sons and daughters of the king and high ranking servants in the palace. In 1915, Sekolah Sri Manganti became the Hollandsch Inlandsche School, and was relocated to east side of Pagelaran Kraton Yogyakarta. Later, its name was again changed into Keputra School.

During the era of Sri Sultan Hamengku Buwono VII (1877-921), Bangsal Trajumas was used as court, while during the era of Sri Sultan Hamengku Buwono VIII (1921-1939), it was used as a venue for holding midodareni ceremonies (a night before marriage, Sultan’s bride-daughter and groom-son will given shower ceremony - upacara panggih).

During the eras of Sri Sultan Hamengku Buwono IX (1939-1988) and Sri Sultan Hamengku Buwono X (1989 to 27 May 2006), Bangsal Trajumas was used as a place to exhibit Kraton Yogyakarta’s moving goods for tourists. Moving goods that are mentioned before are Gamelan Pakurmatan (Kyai Guntur Laut and Kyai Kebo Ganggang), Jempana, Tandhu (including Kyai Tandhu Lawak, which was used by Sri Sultan Hamengku Buwono I), Joli, Crupung, Plangki, Songsong Bawat, Kuthamara, and Krobongan.
Architecture and Details of Bangsal Trajumas

Bangsal Trajumas Kraton Yogyakarta is built in an architectural style known as Limasan Trajumas Sinom Lambang Gantung or Limasan Sinom Trajumas Lambang Gantung, with its unique gajah (brunjung) supported by 6 (six) saka guru. In addition, it has four empyak penanggap spaced to brunjung, and its four sided emper are not separated with atap penanggap. There are 6 (six) saka bentung that function as hangers of blandar lumajang, 4 (four) saka bentung are hung on 4 (four) tip of dudur (jurai). Meanwhile 2 (two) other saka bentung are hung on usuk pandedel (usuk that were located in the middle of empyak brunjung) with bigger size compared to other usuk. All tips of usuk penanggap have their upper tip pushed inside blandar lumajang. The uniqueness of Bangsal Trajumas, besides an architectural design unique to Yogyakarta Palace, lay in the ornaments found on the tip of the saka bentung, which are shaped like a keben fruit, typical of the keben trees planted at the north end of the Kamandhungan yard. Usually, the ornament at the tip of a saka bentung is shaped like a pineapple (nanas), lending to its name, nanasan. It is also called a tawonan because of its beehive shape (rumah tawon).

Another unique element of this Lambang Gantung construction is its composite design construction using both wood and steel. Considering that the pressure from penanggap ceiling is quite hard to prevent deflection or blandar lumajang to bend, blandar lumajang panyelak and pamanjang are given steel bars at some places that are connected to usuk brunjung (gajah). The final unique element is that all the tips of the usuk penanggap are placed inside, rather than on top of, the blandar lumajang. In the past, lambang gantung construction was only used in the palace. Common people dared not use it because it was taboo to make a building resembling a palace building.

The Redesign of Bangsal Trajumas

On 27 May 2006, a major earthquake struck Yogyakarta, causing extensive physical damage and the loss of many lives. This earthquake, registering 5.9 on the Richter scale and lasting 57 seconds, destroyed many houses, office buildings, and some of the buildings at Yogyakarta Palace. The greatest damage at Yogyakarta Palace was to the Bangsal Trajumas, which was totally destroyed. Other buildings were left relatively intact in spite of minor damage. As the Bangsal Trajumas lay flattened on the ground there were many questions to consider: Can this building be rebuilt using the undamaged building parts? Or should it be reconstructed with entirely new parts? Or should the building be rebuilt at all - considering that some construction elements have already been made before?

After lengthy discussions and the solicitation of expert opinions (cultural and scientific), a decision was made to rebuild the structure using the parts of the building that were still usable. A problem arises
when most of the building parts or components have been destroyed and cannot be used for the reconstruction, whether this is caused by decay, sudden collapse, or improper demolition techniques. Another step that had to be taken was to recreate architectural drawings of all the building components - at every scale, at every detail. This step was taken to ensure that there was a complete set of technical documents to work from, and also to ensure the availability of a technical guideline for reconstruction efforts in the future. Such documentation was also needed to avoid procedural or mechanical errors. This step was also taken because of the knowledge that the construction methods originally used to construct this building were very different from current methods, and special construction techniques would have to be used in order to make the connections work as they were originally intended. To prepare this documentation and create a detailed engineering design of Bangsal Trajumas a team was formed of the following members: Kawedanan Hageng Punakawan Wahana Sarta Kriya Karaton Ngayogyakarta Hadiningrat, Universitas Gadjah Mada, Dewan Kebudayaan Provinsi Daerah Istimewa Yogyakarta, Jogjakarta Heritage Society, and Balai Pelestarian Peninggalan Purbakala D.I.Y.

Figure 3.42 The ruins of Bangsal Trajumas and efforts to save movable goods

One of the main leads in the redesign of Bangsal Trajumas Yogyakarta Palace was the identification of signs left on balungan (construction blocks) that were marked by undhagi (carpenters). Those signs indicated directions, as described below:

- Step 1: Group each part of the building depending of its function and type.
- Step 2: Clean wood materials using water to eliminate dust, bat guano, and mushrooms.
- Step 3: Give names and codes to the wood, for example UBE (Usuk Brunjung Empyak), ULP (Usuk Lorog Penanggap). Also find undhagi signs that show the position of the wood. For example, the sign "Narasunya" indicated a south-east positioning.
- Step 4: Measure, draw, and take photographs of all wood structural elements that have been coded.
- Step 5: Test the reconstruction of the Bangsal Trajumas structure to determine the original shape and structural connections. For example, test the roof structure (pamidhangan).
- Step 6: Determine whether original wood materials are still in decent enough condition to be used in the reconstruction.
- Step 7: Create a detailed engineering design (DED) of Bangsal Trajumas based on the original shape of the building determined using measurement results and full reconstruction testing,
including details on wood connections, the original name of the structure and construction elements, and recommendations from the team based on archeological and structural considerations.

- **Step 8** : Make wood construction guidelines that adhere to the principle of conservation in the reconstruction project.
- **Step 9** : Create a proposed budget and outline the construction management process.

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**CASE 3.2.4. Post-Earthquake Revitalization of the Kotagede Heritage District: An Ongoing Study of Efforts to Conserve the Endangered Kotagede Folk Heritage**

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**Introduction**

The regions of Yogyakarta Special Territory (Jogja) and Central Java, Indonesia experienced significant difficulties following the 5.9 magnitude earthquake that struck the area on 27 May 2006. A rapid heritage damage assessment was conducted and showed that many unique forms of cultural heritage had been affected by the disaster. Damage was sustained by monuments such as the Prambanan World Heritage Site, Yogyakarta Palace complex, Pura Pakualaman complex, the Baluwerti Fortress, noble houses, and Royal Cemeteries, as well as folk heritage elements like the traditional houses in the heritage districts of Kotagede, Plered, and Imogiri. Various forms of intangible heritage were also affected, such as local industries in sterling silver, batik craft, pottery, ikad, and many more traditional crafts practiced in the southern part of Yogyakarta City and the Bantul District. Most of these valuable heritage artifacts were located in Opak Vault, the worst-hit area in the May earthquake. The affected area of the Kotagede Heritage District is examined in this study.

Kotagede is located about six kilometers southeast of Yogyakarta City, Indonesia, a palace city built in 1755. The rulers of Muslim Mataram Kingdom were successors of various counts from the 15th century, namely Pajang, Kotagede, Kerto, Plered, Kartosuro, and Surakarta. Later, the Mataram Kingdom was divided into Surakarta and Yogyakarta. Formerly, during the 8th to the 10th centuries, this region was known as Mataram, and was the site of the First Great Central Javanese Empire, which fundamentally followed Buddhist and later Hindi principles. There was a succession of Indian kings, who included the builders of the magnificent Buddhist temple Borobudur, and the Hindu temple Prambanan.
Kotagede, the former capital of the Islamic Mataram Kingdom during the 16th century, means “big city.” It represents the Javanese ideal site and its unique characteristics. As a typical Javanese city, the urban structure of Kotagede was based on the concept of Catur Gatra Tunggal (four components in one). This means that the center of a Javanese city consists of four components: a palace, mosque, market, and square (alun-alun). The palace was surrounded by the wall and an inner moat (Jagang Jero). In the 16th century, Kotagede was a busy and lively center of trade.

In this century, the two components of the Javanese city that remain are the Grand Mosque of Mataram (Masjid Agung Mataram) and the still bustling market. Several other physical landmarks include the Mataram Royal Cemetery, Selirian Ancient Pool, the Clock of Hamengku Buwono VII, Fort Baluwerti, Kalang houses, traditional houses and the townscape consisting of historical buildings, small alleys, and rukunun streets. In terms of its landscape assets, Kotagede has various types of historic flora and fauna, including banyan and other rare trees. The site of the palace and the square are occupied by settlements known as Kampung Alun-alun and Kampung Dalem. Although the remains of the palace and some of its royal features disappeared long ago, the residential structure still exhibits significant aspects of Javanese culture. The current settlements and urban spaces are now mostly utilized as a living cultural asset and are famous for silverwork production.

Administratively, Kotagede (with an area of 442.67 ha and a population of 36,303 as of 2006) belongs to two administrative areas (Yogyakarta Municipality and Bantul Regency). It consists of five urban villages: Kalurahan Prenggan, Kalurahan Purbayan, Kalurahan Basen, Desa Jagalan and Singosaren. As a religious compound, Kotagede invented the fast-learning method of reading the Koran, especially for children. Beyond its well-known reputation in silver crafts, Kotagede is also a center of Javanese arts and crafts (in gold, silver, copper, leather, and other materials), and traditional foods (such as kipo and legomoro). Performing arts include gamelan music groups (karawitan), religious music groups (syalawatan), Javanese poetry reading (mocopat), keroncong music, tingklung wayang puppetry, as well as offerings ceremonies on special days (caos) and leading an ascetic religious life (tirakatan).

**Description of the Study**

Heritage Emergency Response and Recovery in the Yogyakarta Special Territory

Various post-earthquake heritage recovery efforts have been conducted by concerned parties in the Yogyakarta Special Territory, including:

1. **The Emergency Technical Assistance for Post-earthquake Measures for Safeguarding the World Heritage Site of Prambanan and Sewu Temple** supported by UNESCO World Heritage Centre was conducted in collaboration with the Directorate General of History and Archaeology of the Department of Culture and Tourism, the Republic of Indonesia. The Kingdom of Saudi Arabia graciously offered a grant to help restore historical monuments damaged by the earthquake such as Prambanan Komplec, Sewu Temple, and Tamansari Water Castle.

2. **The Culture Agency of Yogyakarta Special Territory** has conducted measurements, rehabilitation, reconstruction and recovery of several damaged monuments in Yogyakarta, including Agung Mosque in Kotagede and the Imogiri Royal Grave in Kraton Yogyakarta.

3. **The Office of Ancient Monuments Conservation (Balai Pelestarian Peninggalan Purbakala)** in Yogyakarta Special Territory has also conducted measurements, rehabilitation, reconstruction and recovery efforts on several damaged monuments in Yogyakarta, including Prambanan Temple, Tamansari Water Castle, and the Imogiri Royal Grave. The rehabilitation of the Imogiri Royal Grave has been supported by Yayasan Keluarga Hashim Djojohadikusuma.

4. **Other agencies in Yogyakarta Special Territory**, such as the Public Works and Social Welfare, have rehabilitated some monuments such as the royal gates, Kraton, and the Imogiri Royal Grave.

5. **Heritage rehabilitation and reconstruction in Yogyakarta** has also been supported by non-profit organizations and the private sector. For example, Mandiri Bank financed the rehabilitation of Pujokusuman Nobel House. HSBC supported the rehabilitation of traditional houses in Tembi.
culture village. Yayasan Keluarga Hashim Djojohadikusuma reconstructed the heritage buildings of elementary and junior high school in Bintaran.

6. Two days after the Yogyakarta Earthquake, the Center for Heritage Conservation, the Department of Architecture and Planning in the Faculty of Engineering at the Universitas Gadjah Mada, and the Jogja Heritage Society, in collaboration with many of their colleagues and institutions (Indonesian Heritage Trust, ICOMOS Indonesia and others) decided to set up a special Heritage Post called “Pusaka Jogja Bangkit!/PJBI” (Jogja Heritage Revival!). This initiative is dedicated to the people of Jogja and the region’s valuable heritage. A rapid assessment of damaged heritage sites, supported by the World Bank Jakarta, was carried out two weeks after the earthquake. It included a budget estimate and time schedule for rehabilitation and reconstruction, and was released on 14 June 2006. This assessment, which included an inventory of both tangible and intangible cultural heritage elements, was also an effort to promote the urgency of reclaiming folk heritage.

The ongoing recovery actions of PJBI have been financially supported by international parties as well as local organizations, including the following:

- The Culture Emergency Response (CER), Prince Claus Foundation of The Netherlands has supported the “Reviving of the Imogiri Folk Batik” which is being coordinated by the Jogja Heritage Society in collaboration with “Sekar Jagad” Jogja Batik Lovers and many other institutions, 2006 – 2007.
- Through Jogja Heritage Society, CER has also financed the rehabilitation and reconstruction of two corners of Baluwerti bastions, Kraton Yogyakarta, 2006 – 2007;
- The Japan International Cooperation Agency (JICA) is supporting the Community Empowerment Program for the Revitalization of the Kotagede Heritage District conducted by Gadjah Mada University in collaboration with various parties including a local community organization, 2006 – 2007.
- The Culture Council of Yogyakarta Special Territory, Gadjah Mada University, and the Jogja Heritage Society have taken the initiative to conduct assessments and create detailed engineering designs for the precious complexes of the Yogyakarta Palace and the Pura Pakualaman, financed by Gadjah Mada University, 2006 – present.

7. The restoration of the area’s intangible heritage has been highlighted as an important aspect of post-earthquake heritage recovery efforts. For example, the “Revival of Imogiri Folk Batik” is being coordinated by the Jogja Heritage Society in collaboration with “Sekar Jagad” Jogja Batik Lovers, and supported by the Culture Emergency Response (CER), Prince Claus Foundation of The Netherlands. The Jogja Heritage Society is also working in collaboration with the Australia Indonesia Partnership: Yogyakarta-Central Java Community Assistance Program on conducting the Development of the Batik Home Industry for Community Welfare Improvement in Giriloyo, Wukirsari, Imogiri, and Bantul Yogyakarta. Meanwhile, UGM is working in collaboration with Exxon Mobile on the Post-Earthquake Revival of Kotagede Crafts.

Heritage Emergency Response and Recovery in the Kotagede Heritage District

Many efforts have already been made toward the goal of heritage recovery, but the folk heritage represented by traditional houses of wooden construction in the Kotagede Heritage District, as well as those in the nearby craft villages, and the home craft industries as forms of intangible heritage, are still at risk. Many of these houses are in the process of being sold and removed from the heritage district. While the government policy and action program on housing reconstruction proceeds, it does not cover traditional houses, and many potential craftspeople have moved into new trades that offer them some kind of income. These forms of folk heritage, tangible and intangible, are in grave danger of disappearing.

One of the PJBI’s priorities in terms of post-disaster programs is to pursue the revitalization of the Kotagede Heritage District in a way that goes beyond quick emergency relief and the long-term recovery program. PJBI is proposing a comprehensive revitalization program that will unify and redirect all
revitalization efforts toward the common goals of restoring both tangible and intangible heritage elements, and restoring the local economy, as this is an essential part of achieving sustainable urban development. The vision and mission are as follows:

1. **Vision:** The rebirth of the Kotagede Historic District with social, cultural, and environmental quality better than it had prior to the earthquake, such that the community has the capacity to manage the restored cultural heritage elements independently and such that the restored heritage elements can in turns have a positive economic and cultural impact on the community.

2. **Mission:**
   - Revitalize tangible and intangible heritage elements, including the gotong-royong tradition of the local community, and encourage community participation and leadership.
   - Develop community awareness and promote collaboration among many stakeholders in the revitalization process.
   - Restore environmental quality and economic conditions by raising per capita income, if possible even higher than pre-earthquake levels.
   - Create unified revitalization efforts by restoring the spatial planning and infrastructure of the historic district.
   - Promote Kotagede Heritage District as an integral part of Indonesia’s national and international heritage.

Revitalization is type of conservation that not only focuses on conserving physical properties or natural resources, but also comprehensive conservation. Several on-going initiatives have been carried out, as follows:

1. **Community Empowerment Program to Revitalize the Kotagede Heritage District.**
   - A collaborative project of the UGM and JICA conducted in 2006-2007 as the “Community Empowerment Program through POSYANIS and Village Revitalization in the Bantul District.” This program focuses on developing the local economy by strengthening both tangible and intangible heritage aspects that have valuable potential for economic and sustainable development.

2. **Kotagede Heritage District as 2008 World Monument Watch List of 100 Most Endangered Sites.**
   - In 2007, the Jogja Heritage Society nominated Kotagede Heritage District to the World Monument Fund, New York to be on the list of the 2008 WMW List of 100 Most Endangered Sites, and the nomination was approved.

3. **Folk Heritage Rehabilitation and Reconstruction**
   - The Jogja Heritage Society, supported by the government of The Netherlands, assisted in the rehabilitation and reconstruction of four traditional houses in Kotagede and provided operational funds to the local historic district management organization (Organisasi Pengelola Kawasan Pusaka/OPKP). The four houses are owned by the Koko family, Edi family, Gembong family, and Djoko family.
   - Donations participants in the Better Air Quality Conference supported the renovation of the rear part of the Koko family’s residence so it can serve as the new OPKP headquarters.
   - Total Indonesie, a French oil company, in collaboration with UGM, supported the rehabilitation of two traditional houses (Mukadi house and Omah UGM) and the reconstruction of the old electrical power house, a Kotagede landmark.

4. **Heritage Investment**
   - A damaged traditional house on 750 m² of land in Jagalan, Kotagede, including all of its furniture, was purchased by UGM right after the 27 May earthquake. The house will be developed into a Center for Heritage Movement UGM, now known as “Omah UGM” (UGM house). This effort is part of UGM’s commitment to long-term involvement in helping the Kotagede local community revitalize their heritage district.
Indonesia is actually still in the early stages of heritage conservation and knowledge of issues related to the disaster risk management of heritage sites is still limited. The new Disaster Mitigation Law (No. 24, 2007) does not contain a single word about heritage. Among the heritage recovery projects the government is involved in, those involving more prominent cultural monuments (*adipusaka budaya*) receive the greatest attention, while little is given to folk heritage elements (*pusaka rakyat*) that are distributed throughout the residential neighborhoods throughout the disaster-stricken areas. For example, the housing rehabilitation and reconstruction program does not cover the reconstruction of traditional houses.

Learning from one year emergency response and heritage in the case of Kotagede Heritage District revitalization, new movements on heritage conservation in Jogja as well as Indonesia have emerged. These new movements are focused on:

- Developing the a disaster risk management protocol for heritage elements, including a review of the Disaster Mitigation Law (No. 24, 2007).
- Promoting more heritage recovery efforts directed at folk heritage elements, tangible and intangible.
- Implementing an alliance between heritage conservation proponents and micro-small-medium-sized businesses to recovery at the local as well as national level.
- Conducting capacity building in the disaster risk management of heritage elements using community mediators and experts on traditional construction.
- Formulating a Heritage District Master Conservation Plan and Cultural Landscape Regional Conservation Plan that addresses the disaster risk management of heritage elements.

Those new movements will be executed under the program in “Omah UGM” as follows:

- Organize formal and public education and training programs for community members, executives, legislators, professionals, and local, national and international scholars on heritage conservation and risk disaster management for heritage.
- Implement conservation actions especially on folk heritage.
- Form partnerships with government, academic institutions, local communities, and the private sector on developing disaster risk management strategies for heritage artifacts.
- Actively participate in community activities in Kotagede.
- Raise funds for the renovation and maintenance of “Omah UGM.”

![Rehabilitation and reconstruction of “Omah UGM”](source: Adishakti)
Facilities currently planned to be part of “Omah UGM” are a public space (pendapa), a folk heritage museum corner, library, classroom, meeting room, studio, office, archive, accommodations for researchers, and a small café. Part of the damaged building on this property will be conserved as a monument to the earthquake. This ongoing reconstruction project can be implemented because of the generous support provided by concerned parties:

- Reconstruction of a traditional public gathering space, pendapa, supported JICA
- Rehabilitation of the dalem by Total Indonesie, an international oil company
- Rehabilitation of the gandok by Exxon Mobile.

5. Formulation and Publication of Heritage Conservation Manuals


- The Jogja Heritage Society and UN Habitat Fukuoka, Japan will soon publish the Conservation Manual of the Kotagede Heritage District, Yogyakarta, Indonesia, 2008.
- The Jogja Heritage Society and UN Habitat Fukuoka, Japan will soon publish documentation on the Post-Earthquake Reconstruction of the Kotagede Heritage District, Yogyakarta, Indonesia, 2008.

6. Post-Earthquake Revival of Kotagede Crafts

Since 2007, the UGM Department of Architecture and Planning, in collaboration with Exxon Mobile, have been implementing the Post-Earthquake Revival of Kotagede Crafts. Efforts to safeguard this intangible form of cultural heritage aims to revitalize the livelihoods of local craftsmen through marketing, cultural revitalization, and tourism development. Many new silver jewelry designs using the “Kotagede Crafts Post Earthquake” branding have been launched and widely exhibited at such events as the Jogja Craft Expo 2008, the New York International Jewelry Show 2008, and the Surabaya Jewelry Show 2008.

![Figure 3.46 Kotagede Crafts Post Earthquake brand jewelry](image)

7. Education: Kotagede Field Studies

The Post-Earthquake Kotagede Heritage District Revitalization program has encouraged various educational institutions to participate in the process of learning about revitalization. Meanwhile, the process itself needs more professional knowledge and human resource expertise, especially among the younger generation working in this field. Several field studies have been conducted on site in Kotagede, as follows:
• A study of The Role of UGM in the Kotagede Post-Earthquake Revitalization Program, a collaborative program implemented by Sawaki Laboratory, Osaka University, and the UGM Department of Architecture and Planning. September 2008.

• 2008 Summer School in Jogja: Case Study on the Kotagede Heritage District, a collaborative work between the UGM Department of Architecture and Planning and the Uzo Nishiyama Memorial Library Japan. 17-21 August 2008.

• UGM Undergraduate Field Study “Exploration and Promotion of Heritage Economic Aspect as Part of the Kotagede Heritage District.” July – August 2008.


• “International Field School for Asian Heritage: Kotagede Preliminary Conservation Master Plan Post Earthquake”. A field study jointly organized by the Center for Heritage Conservation, UGM Department of Architecture and Planning and the Urban Design and Conservation Research Unit (UDCRU), Faculty of Built Environment, UTM, Malaysia, in Kotagede, Yogyakarta, supported by the Japan Foundation, Kuala Lumpur. February 2007.

CASE 3.2.5. Recovery Efforts at Prambanan Temple after the Earthquake of 27 May 2006

HERNI PRAMASTUTI

Head of the Center for the Conservation of Archaeological Relics Yogyakarta

Introduction

A thousand years ago, from about the 9th century up to the first quarter of 10 BC, the Prambanan Plain was recognized as the capital of ancient Mataram. Many Hindu and Buddhist buildings can be found in the western and eastern lowlands along the Opak River up to the south hills. Many of these are stone structures, including hundreds of lingga-yoni and statues of gods or goddesses (some of which can be renovated), while the rest are only the foundations or ruins of ancient structures. There are approximately 18 inscriptions engraved in stone and copper throughout this area. Many of the temples on the Prambanan Plain have the quality of empire building. It is shown in great ornament, the splendor architectural building, the width complex, the detail relief and well-carved pantheon statue. Those temples architecturally vary. Prambanan is has a high density of archaeological remains from 9-10 BC, reflecting the complex socio-cultural system of the time.
Ancient Prambanan was located along an old fault. After the 2006 earthquake, it is a bit elevated. Several of the temples were severely damaged, including Sojiwan Temple, which was being renovated, and Sewu and Plaosan. The destruction of these symbols of ancient Javanese civilization offers some insights into why that civilization disappeared. Both geological history and human history occur in repeating cycles.

**Prambanan Temple after the Earthquake**

Prambanan has become a world tourism destination since it was listed (as site no. 642) on the World Heritage List in 1991. Prambanan is located in Kalurahan Bokoharjo, Kecamatan Prambanan, Kabupaten Sleman, Yogyakarta Province. Almost all of its buildings were damaged by the earthquake, to varying degrees and with various types of destruction. There were two kinds of damage: structural and material. The structural damage includes cracking, sloping, rusting, and deforming, which impact the structure and stability of the building. The material destruction of the stones includes falling, breakage and shelling. Kemuncak and ratna, the upper stones, fell into the gates and hedge when the earthquake struck. The damage sustained by each temple is unique to that structure, influenced by both internal and external factors. The internal factors include the type of structure, construction method, and renovation techniques used, while the external factors include the environment and the ground motion at the time of the earthquake.
Table 3.13 List of Structural Damage

<table>
<thead>
<tr>
<th>No</th>
<th>Buildings</th>
<th>The number of affected locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Brahma Temple</td>
<td>14</td>
</tr>
<tr>
<td>2.</td>
<td>Siwa Temple</td>
<td>81</td>
</tr>
<tr>
<td>3.</td>
<td>Wisnu Temple</td>
<td>23</td>
</tr>
<tr>
<td>4.</td>
<td>Garuda Temple</td>
<td>13</td>
</tr>
<tr>
<td>5.</td>
<td>Nandi Temple</td>
<td>8</td>
</tr>
<tr>
<td>6.</td>
<td>Angsa Temple</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>West Gate 1</td>
<td>-</td>
</tr>
<tr>
<td>8.</td>
<td>South Gate pagar 3</td>
<td>-</td>
</tr>
<tr>
<td>9.</td>
<td>Gate 1</td>
<td>8</td>
</tr>
<tr>
<td>10.</td>
<td>South Apit Temple</td>
<td>8</td>
</tr>
<tr>
<td>11.</td>
<td>North Apit Temple</td>
<td>14</td>
</tr>
<tr>
<td>12.</td>
<td>Kelir Temple</td>
<td>12</td>
</tr>
<tr>
<td>13.</td>
<td>Patok Temple</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 3.14 List of Material Damage

<table>
<thead>
<tr>
<th>No</th>
<th>Buildings</th>
<th>Number of stones</th>
<th>Fallen</th>
<th>Broken</th>
<th>Fragments</th>
<th>Cracks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>First Yard</td>
<td>215</td>
<td>164</td>
<td>196</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Brahma Temple</td>
<td>52</td>
<td>149</td>
<td>161</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Siwa Temple</td>
<td>7</td>
<td>277</td>
<td>563</td>
<td>479</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Wisnu Temple</td>
<td>6</td>
<td>20</td>
<td>101</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Garuda Temple</td>
<td>12</td>
<td>15</td>
<td>28</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Nandi Temple</td>
<td>16</td>
<td>32</td>
<td>147</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Angsa Temple</td>
<td>9</td>
<td>13</td>
<td>94</td>
<td>05</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>West Gate 1</td>
<td>300</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>South Gate 3</td>
<td>Total</td>
<td>1100</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10.</td>
<td>Gate 1</td>
<td></td>
<td>1100</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11.</td>
<td>South Apit Temple</td>
<td>18</td>
<td>22</td>
<td>-</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>North Apit Temple</td>
<td>22</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Kelir Temple</td>
<td>12</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>14.</td>
<td>Patok Temple</td>
<td>-</td>
<td>79</td>
<td>-</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Recovery Efforts at Prambanan Temple After the Earthquake: Approach and Methodology

Recovery efforts at Prambanan after the earthquake were pursued from several basic approaches: cultural heritage conservation, environmental conservation, and disaster management.

1. **Cultural heritage conservation**

Cultural heritage conservation is all about understanding cultures of the past. The basic premise of this approach is to maintain and restore, rather than replace, ancient elements. Replacement is not allowed because new elements cannot replicate the spirit of past production processes, and do not retain the soul and the spirit of ancient cultures. Conservation is an effort to preserve an artifact, its physical condition as well as its value, and prevent its destruction. The maintenance on such artifacts is based on four principles of authenticity, as stated in the related regulations: authenticity of materials, design, workmanship, and installation.

2. **Environmental conservation**

The conservation of cultural heritage in this modern era should be pursued in consideration of environmental conservation. Considerations should address:

- Carrying capacity: physical, ecological, social, cultural, and psychological.
- Air and water quality maintenance, field conservation, environmental and heritage protection, and improvements to the quality of settlements.
- Construction planning should involve environmental impact assessments to evaluate potential causes of environmental damage.
- Program planning should be done comprehensively, in coordination and collaboration with experts who have knowledge in relevant fields.
- Identifying the area to be preserved and the management of its use through a zoning system
- Disaster management

Cultural heritage conservation principles have been developed and to guide renovation approaches. Suitable principles must be adhered to in order to anticipate risks posted to the cultural heritage. Some changes had to be made in the management of Prambanan Temple. Before the earthquake, visitors were allowed free access to the first yard. After the earthquake, they were allowed to enter the first yard, but not to enter the main temples, especially Brahma and Siwa, due to the conditions of those structures. Nandi is expected to be open to visitors soon (in 2009), since renovations to that building were completed in 2008. Garuda Temple was reopened to visitors in July 2008.

There were three phases to the handling of Prambanan after the earthquake: rescue, emergency and recovery. The rescue and emergency phases involved protecting the buildings to prevent more severe damage from occurring and to minimize accidents that might be caused by falling stones. The rescue operations included documentation, observation of structural and material damage, the rescue and demolition of building parts on the verge of ruin, technical study, reattachment of fragments, covering of cracks, registration of fallen stones in the yard and hedges, and the renovation of Patok Temple.

Generally, emergency efforts included both internal and external activities. The internal activities included damage observation and the placement of police lines to close the temple. The stage was set 14 days after the earthquake, and visitors were allowed to enter the first yard 45 days later. The external efforts included coordination with other institutions, the sharing of information with the public through the mass media, and coordination with international organizations like UNESCO.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Rescue</td>
<td></td>
</tr>
<tr>
<td>Step I</td>
<td>19 June- 15 August 2006</td>
</tr>
<tr>
<td>Step II</td>
<td>16 August- 30 September 2006</td>
</tr>
<tr>
<td>II. Emergency</td>
<td></td>
</tr>
<tr>
<td>South Gate Technical Study</td>
<td>October 2006</td>
</tr>
<tr>
<td>Wahana Temple Technical Study</td>
<td>December 2006</td>
</tr>
</tbody>
</table>
### ACTIVITY |
<table>
<thead>
<tr>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trimurti Temple (Brahma, Siwa and Wisnu) Technical Study</td>
</tr>
<tr>
<td>Geotechnical investigation</td>
</tr>
<tr>
<td>Geodetic study</td>
</tr>
<tr>
<td>Georadar study</td>
</tr>
<tr>
<td>Expert Meeting</td>
</tr>
<tr>
<td>Technical Meeting</td>
</tr>
<tr>
<td>Evaluation Study on Stone Reinforcement System at Wahana Temple (Garuda, Nandi and Angsa)</td>
</tr>
<tr>
<td>Ancient River Geophysical Study</td>
</tr>
<tr>
<td>Ancient River Geological Study</td>
</tr>
<tr>
<td>Seismometer application</td>
</tr>
<tr>
<td>Concrete Study</td>
</tr>
</tbody>
</table>

### III. Recovery

- Rehabilitation Garuda Temple step I: October-December 2007
- Rehabilitation Garuda Temple step II: January 2008
- Rehabilitation Garuda Temple step III: April-July 2008
- Rehabilitation West Gate first yard: July 2008
- Rehabilitation Nandi Temple: August-December 2008

The recovery efforts included rehabilitation activities launched in October 2007 at Garuda Temple, and they continued into 2008 with the completion of renovations to Nandi Temple. The recovery efforts adhered to principles and methods of rehabilitation that took into consideration archaeological aspects, as well as the conservation of stone material.

Figure 3.50 Registration of fallen stones (left) & reattachment of broken stones
Lesson Learned

There were three main purposes to this effort: architectural recovery, structural recovery, and environmental recovery. Architectural and structural recoveries were undertaken from 2007 to 2009, and included rehabilitation efforts at Garuda Temple, Nandi Temple and the West Fence. The environmental recovery is related to Prambanan Temple’s role as an international and national tourist destination. It can offer some safety tips for visitors. On the other hand, the severe damage sustained by temple building could become a target of earthquake research.

Several problems were faced over the course of this rehabilitation project:

- Technical problems: examination of structural strength in order to anticipate another disaster (earthquake) in the future.
- Funding problem: The recovery of Prambanan Temple was an expensive undertaking. Some funding was received from APBN, PT. Taman Prambanan, Borobudur, and Ratu Boko, and the Ministry Cultural and Tourism intends to seek donation from other institutions.

CASE 3.2.6. Development of Community-Based Earthquake Hazard Mapping; A Pilot Study in Bantul, Yogyakarta Province, Indonesia

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Introduction

An earthquake hazard map is urgently needed to support earthquake disaster risk reduction efforts, and also to support the development of a new regional development plan. Earthquake hazard maps are a technical tool used to anticipate the potential ground motion distribution and intensity that might result from any potential seismic source. An earthquake hazard map can be developed using deterministic approach by conducting geological and geotechnical site investigations and analyses. Despite the importance of earthquake hazard maps, most are too technical to be understood by policymakers and the general public. They may also have negative implications from a socioeconomic point of view, as they may deter the pursuit of economic growth in seismically vulnerable areas. This paper addresses a new approach to hazard mapping which can minimize such impacts. The suggested approach is an integration of technical and psycho-social approaches, as discussed below.

Figure 3.52 Geological Map of Yogyakarta Province (by Rahardjo et al., 1995 at the scale of 1:100,000).
Geology of Yogyakarta

Apart from poor housing construction methods and the distance of such construction from the earthquake epicenter, it is also apparent that the geology of Yogyakarta Province played an important role in the level of ground amplification caused by the earthquake and thus in the level of housing damage. Bantul Regency, which is situated in the southern part of Yogyakarta Province, rests on loose deposits of volcanic gravelly sand (Yogyakarta Formation) and gravelly sand-clay (alluvium, Figure 3.52). This sediment was transported from the Merapi volcano and deposited into the ‘graben’ valley, which was formed by several normal faults occurring in the limestone bedrocks of the Sentolo Formation, as illustrated in Figure 3.53. Geological and geophysical site investigations on the loose volcanic deposits were carried out by Karnawati et al. (2006) to support ground amplification mapping, and the results of these investigations have been incorporated into this community-based earthquake hazard-mapping project.

Mapping Method

1. Technical Approach

The main objective of developing an earthquake hazard map using a technical (deterministic) approach is to estimate the ground motion distribution and intensity that would be produced by an earthquake from any potential source (Karnawati et al., 2008a and 2008b). The geological map of Yogyakarta developed by Rahardjo et al. (1995) was used as a starting point for defining the earthquake hazard-mapping area in Bantul (Figure 3.52). Determination of alignment for a site investigation was defined based on the geological profile developed by McDonald (1984) and Hendrayana (1993), as illustrated in Figure 3.53. Meanwhile, the parameters to consider and mapping methods mapping are discussed below.

Parameters to Consider

As suggested by Anonym (2007) and Karnawati et al. (2008 and 2009), an earthquake hazard map developed using a deterministic approach should be based on the integrated assessment of several factors.
significant parameters controlling the distribution and intensity levels of potential ground motion that might occur during any future earthquakes. The parameters to consider include:

- Ground amplification distribution and intensity
- Groundwater table distribution
- Distance to the suspected active fault

The distribution of each parameter was investigated and mapped. Figure 3.54 shows the ground amplification distribution and intensity, Figure 3.55 shows the groundwater table distribution, and Figure 3.56 shows the distribution of faults.

Next, each of the parameters was assessed according to its level of importance (the weight factor) and severity (considered by giving the score) of the three parameters above in controlling the potential ground response. The most important controlling parameter was the distribution and intensity of ground amplification, so this parameter was weighted more heavily than the other parameters (weight factor: 2). Meanwhile, a weight factor of 1 was applied to the less important parameters (the position and distribution of groundwater table depth as well as the fault distribution and distance to the fault).

Figure 3.54 Ground motion amplification map (Karnawati et al., 2008a)
Figure 3.55 Groundwater table map (Karnawati et al., 2008a)

Figure 3.56 Fault distribution map (Karnawati et al., 2008a)
Scoring criteria to address the levels of severity for ground amplification and groundwater table distribution were provided as listed in Tables 3.16 and 3.17, respectively, while the criteria and scoring related to the distance to the nearest suspected active fault zone were provided in Table 3.18.

Finally, the integrated assessment of all controlling earthquake hazard parameters was carried out by overlaying all the maps, as well as by calculating the weighted scores using the following formula.

\[ S = \sum_{i=1}^{n} w_i s_i \]

Where “S” is susceptibility level, “w” is the weight of each parameter indicating its level of importance, and “s” is the score or level of severity.

Table 3.16 Criteria, Level and Score for Ground Motion Amplification Assessment

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground amplification causing a sediment response of 7-20 times the solid bedrock response</td>
<td>Very high</td>
<td>4</td>
</tr>
<tr>
<td>Ground amplification causing a sediment response of 5-7 times the solid bedrock response</td>
<td>High</td>
<td>3</td>
</tr>
<tr>
<td>Ground amplification causing a sediment response of 1-5 times the solid bedrock response</td>
<td>Moderate</td>
<td>2</td>
</tr>
<tr>
<td>Ground amplification causing a sediment response equal to or less than the solid bedrock response</td>
<td>Low</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3.17 Criteria, Level and Score for Groundwater Table Assessment

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater table at depth of less than 5 meters</td>
<td>Very shallow</td>
<td>4</td>
</tr>
<tr>
<td>Groundwater table at depth of 5-10 meters</td>
<td>Shallow</td>
<td>3</td>
</tr>
<tr>
<td>Groundwater table at depth of 11-15 meters</td>
<td>Moderate</td>
<td>2</td>
</tr>
<tr>
<td>Groundwater table at depth of 16-20 meters</td>
<td>Deep</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3.18 Criteria, Level and Score for Distance to the Nearest Fault

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>The area is situated within 100 m of the nearest suspected active fault</td>
<td>4</td>
</tr>
<tr>
<td>The area is situated within a radius of 100-500 m of the nearest suspected active fault</td>
<td>3</td>
</tr>
<tr>
<td>The area is situated within a radius of 500-1,000 m of the nearest suspected active fault</td>
<td>2</td>
</tr>
<tr>
<td>The area is situated within a radius of more than 1,000 m of the nearest suspected active fault</td>
<td>1</td>
</tr>
</tbody>
</table>

Method of Investigation

To obtain data on all considered parameters, geological and geotechnical site investigations were carried out using:

Topographic mapping supported by aerial photo surveys (scale 1:25,000)

- Geological mapping (at scales 1:100,000 and 1:25,000) supported by geotechnical drilling (14 drilling holes) and undisturbed soil/rock samplings up to 40 m depth/hole or 400 m total depth
- Geotechnical in-situ tests (SPT and permeability tests)
- Geophysical in-situ tests (Vs logging and density logging)
- Microtremor survey with 325 pints of measurement through 6 section lines perpendicular to the direction of sedimentation (scale 1:25,000)
- Magneto telluric surveys at selected sections across the basin of sedimentation
- Ground penetration radar on selected sections across the fault zones
- Groundwater table mapping (scale 1:25,000)
Results of Earthquake Hazard Mapping by Technical Approach

Based on integrated assessments of all the investigated parameters, four susceptibility zones can be established as described below. These are illustrated in Figure 3.57 and listed in Table 3.19 together with the recommended land use management principles for each zone.

- **Very high susceptibility**

  This area is highlighted in red on the hazard map and covers several districts, as listed in Table 3.19. The most severe impacts of any future earthquakes are most likely to occur in this zone. The potential ground amplification here can be as much as 7 times greater than that of bedrock. This elevated hazard is due to the thick (up to 30 m) and very loose sediment (as indicated by relatively low average SPT value, i.e. < 20) consisting of interbedded gravelly sand and silty sand from recent Opak River deposits, a shallow groundwater table (i.e. 5 m depth or less), and close proximity to a fault zone (less than 100 m).

  Consequently, the infrastructure, building code, and land use management principles in this zone should be developed in consideration of its high hazard level. The people living in this zone should also adapt their behavior in preparation for a potential earthquake disaster that could strike their community at any time.

- **High susceptibility**

  This area is highlighted in orange on the hazard map, and includes several districts as listed in Table 3.19. This zone is likely to be very severely impacted by future earthquakes. Soil amplification can be 5-7 times greater than the amplification of solid bedrock as it consists of relatively more compact sediment, indicated by a somewhat higher average SPT value of 20-30 because of the existence of loose sediment (interbedded gravelly sand and silty sand from the Opak River paleo channel). This zone also has a shallow groundwater table (5 m depth or less) and is located in close proximity to an active fault zone (100-500 m). Consequently, the infrastructure, building code, and land use management principles in this zone should be developed in consideration of these known hazards. The people living in this zone should adapt their behavior in preparation for a potential earthquake disaster that could strike their community at any time.

- **Moderately susceptibility**

  This area is highlighted in yellow on the map, and includes several districts as illustrated in Table 3.19. This zone is likely to sustain moderately severe impacts as a result of future earthquakes, due to its rather loose alluvial sediment (interbedded sand and silty sand), relatively shallow groundwater table (about 5 m depth), and the distance to the suspected active fault zone (within 500-1,000 m). The building code and land use management regulations need not be as strict as in the high and very high susceptibility zones. However, the people living in this zone should also adapt their behavior in preparation for a potential earthquake disaster that could strike their community at any time.

- **Low susceptibility**

  This area is highlighted in green on the map, and covers several districts as shown in Table 3.19. Compared with other zones on the hazard map, this zone is considered the safest, where the ground response to any future earthquake will not be especially strong. The sediment in this zone is quite dense (silty sand of alluvium), with an SPT value >40. The groundwater table is rather shallow (5-10 m depth), and the zone is situated rather far from any suspected active faults (>1,000 m). Therefore, future earthquakes may not have a serious impact here.

2. **Combined Technical and Social Approach**

   To minimize the negative social implications involved in the creation of earthquake hazard maps, the survey and social mapping activities were carried out with specific objectives:
• Understand the social conditions in the most vulnerable areas by identifying the psycho-social impacts of the earthquake on the community.
• Develop appropriate strategies and programs for seismic disaster mitigation in the vulnerable zones.

Survey Methods

These social surveys were carried out in February to March 2007 by distributing questionnaires to 300 respondents living in the four different susceptibility zones across 12 sub-districts and 58 villages in Bantul, to facilitate the observation of conditions indicative of:

• The community's baseline knowledge of earthquake phenomena
• Community anxiety in response to the last earthquake disaster
• Psychological awareness of the natural disaster risk

All respondents were independent adults. Data collected from each earthquake susceptibility zone was analyzed using descriptive statistics, and the results were illustrated in bar charts (Figure 3.58).

![Earthquake hazard map](image)

Figure 3.57 Earthquake hazard map (Karnawati et al., 2008a, 2008b)

<table>
<thead>
<tr>
<th>Susceptibility level</th>
<th>Districts</th>
<th>Recommended Land Use Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Sedayu</td>
<td>Most suitable for residential settlements, lifeline facilities, and socioeconomic development.</td>
</tr>
</tbody>
</table>

Table 3.19 Districts which are susceptible to the intense ground shaking from future earthquakes and the recommended land use management
Figure 3.58 Results of the community hazard mapping project (Karnawati et al., 2008c)
Thus, the final result of the community-based earthquake hazard map project is an integration of an earthquake hazard map and social maps. The schematic framework of the methods and processes used to prepare such a hazard map is illustrated in Figure 3.60.

**Survey Results**

Based on the integrated earthquake hazard and social impact map, the psycho-social conditions of each susceptible zone can be described as follows:

- Very high susceptibility zone
Forty percent of the respondents living in this zone were still suffering from anxiety due to the 27 May 2006 earthquake. Only 8.52% of respondents were aware the fact that they are living in very high susceptibility zone. All of those psychological conditions may be related to the fact that none (0%) of the respondents had sufficient knowledge of earthquake phenomena.

- High susceptibility zone
  
  Surveyors found that 31.36% of the respondents were still quite anxious and only 13.70% were aware of the fact that they are living in a high susceptibility zone. Only 5.81% of respondents had knowledge of earthquake phenomena.

- Moderately susceptibility zone
  
  More than 24.42% of respondents living in this zone experience anxiety, while 15.58% were aware of the fact that they are living in a high susceptibility zone. Compared to those living in the very high and high susceptibility zones, more respondents (10.39%) had sufficient knowledge of earthquake phenomena.

- Low susceptibility zone
  
  This zone had the lowest levels of anxiety and acceptance of their living situation, at 28.14% and 14.36% respectively, despite the fact that a rather small percentage of respondents (10.33%) had sufficient knowledge of earthquake phenomena. The psycho-social survey results revealed that most (more than 80%) of the respondents living in the four different earthquake susceptibility zones had quite a poor understanding of earthquake phenomena. This may explain why the level of anxiety was still relatively high and the level of acceptance was relatively low. The highest level of anxiety was found in the very high susceptible zone, possibly due to the fact that this was where the strongest ground shaking occurred, and also where the level of community knowledge and preparedness was lowest.

Discussion

1. Limitations of the technical approach

The earthquake hazard maps produced mainly using a technical approach were not quite simple enough to be easily understood by both policymakers and the general public, due to their limited knowledge of earthquake and geological phenomena. There were some misunderstandings of the symbols and colors used in the new maps. However, the introduction of a technical earthquake hazard map directly to a community with the particular psychological conditions described in Section 4.2.2 can have some undesirable effects. For example, it can further increasing the level of anxiety, creating just the opposite effect of what is trying to be achieved by community empowerment efforts aimed at disaster risk reduction. Economic investment plans can also be negatively affected, as land values may drop significantly and deter investors from appropriately developing zones with moderate to high hazard levels.

2. Strategies to compensate for the limitations of the technical approach

To minimize the limitations of the technical approach, a psychological element had to be added to the technical intervention, which was to be taught as a part of public education program to disseminate hazard-mapping techniques (Anonym, 2008). This intervention was applied by:

- Communicating and disseminating the map to policymakers, i.e., the provincial governors, district heads, and sub-district heads (Figure 3.60).
- Public education initiated by Training-of-Trainers activities to facilitate the establishment of motivator teams as agents of community education.
- Public consultation to empower the motivator teams selected to serve as the agents of community education.
• Regular insight monitoring on the process of public consultation and education conducted by the motivator teams.
• Evaluations to enhance the community empowerment program through public education.

The intervention program empowered the motivator teams to produce community earthquake hazard maps for their own villages, with more detailed non-technical information, as shown in Figure 3.59. Also, interventions should be conducted earlier, before or during technical investigations and surveys. Survey activities conducted immediately after the earthquake resulted in public misunderstandings and anxiety, especially in response to site investigation activities such as drilling, well logging, and geophysical surveys (micro tremor, geo-radar and magneto telluric). Those activities led to rumors that the ground had become seriously damaged after the earthquake and that rapid ground subsidence was occurring. Moreover, the red zone indicated in the map was believed to be the most likely zone for deep subsidence.

3. Advantages of proposed integrated mapping approach

The new approach of integrating earthquake hazard mapping with psycho-social mapping clearly offers several advantages:

• Minimizes the negative psycho-social impacts of technical mapping.
• Optimizes the effective implementation of hazard maps by policymakers and raises public awareness.
• Supports the strategy for effective community empowerment with respect to public education for earthquake disaster risk reduction.

4. Challenges in the implementation of the integrated mapping approach

Despite some of the advantages listed above, the main challenge to implementing this proposed mapping approach is the complicated process, in terms of effort and time, of integrating and communicating information between people in different disciplines and fields of expertise during the course of investigation and analysis. Moreover, communication between experts and the general public often requires a longer process, which makes the map illustrated in Figure 3.60 rather difficult to provide to meet urgent needs. However, this approach can provide a greater likelihood of success in terms of improving community awareness and empowering communities in earthquake-susceptible areas. This approach may also be implemented for different types of hazard mapping. On the other hand, the map in Figure 3.59 is quite simple, and thus may be more appropriate for meeting urgent needs, in spite of reduced accuracy. Still, this may serve just as well in terms of providing a general guideline and early warning for the local village.

Conclusion

A technical approach to earthquake hazard mapping can have some serious negative impacts, such as increasing community anxiety and preventing financial investment and growth, both of which are just opposite of what is trying to be achieved with strategies for disaster risk reduction. The technical maps resulting from this process can also lead to misinterpretation of the illustrated susceptibilities, due to the community’s limited geological knowledge. Therefore, an integrated technical and psycho-social approach to earthquake hazard mapping is proposed as a better model of mapping. This integrated approach is considered to be the most appropriate for an area that has recently suffered an earthquake disaster. Public education, especially to explain the necessity of mapping as well as to provide a basic understanding of geological and earthquake phenomena, should also be conducted in parallel with this proposed new approach, in order to minimize the negative impacts of hazard mapping.

Acknowledgment

This hazard mapping project was initiated as a part of the Earthquake Emergency Response funded by JICA – AUN Seed Net in JFY 2006. The mapping activities then continued to be funded by the British
Council under the Development Partnerships in Higher Education (DelPHE) Program for the years 2007-2010. Therefore, we would like to give special acknowledgement to both funding institutions.

3.3. Governance

Agus Pramusinto

Pre Disaster: Satlak, Satkorlak, and Bakornas

Disasters are not merely physical events. According to Goel,¹ disasters are closely related to public administration since “Any systematic effort towards earthquake management must be preceded by, or coupled with, efforts to make more effective the functioning of governmental machinery.” Goel² analyzes the issue of disaster governance from several perspectives: (a) the policy and administrative framework for disaster management; (b) planning for disaster management; (c) public administration in disaster management; (d) material and financial management during relief operations; (e) human resource development, teamwork, and conflict resolution in disaster management; and (f) the role of local institutions in disaster management.

The disaster experiences of many areas of Indonesia, including Bantul and Yogyakarta, highlight the failure of the existing institutional framework for disaster management. The existing organizations responsible for managing disasters were Satuan Pelaksana (Satlak)³ at the district level and Satuan Koordinator Pelaksana (Satkorlak)⁴ at the provincial level. Badan Koordinasi Nasional Penanggulangan Bencana (Bakornas PB⁵) was the coordinating organization at the national level. However, these organizations suffered some weaknesses that prevented them from working effectively. First, Satlak, Satkorlak and Bakornas PB were not effective because of their ad-hoc organizational status. The three existing organizations worked only during the disaster by focusing on emergency response. During non-emergency situations, however, such organizations seemed weak and disengaged.

Second, the authority of the existing organizations to execute programs was very weak. As the executors of disaster programs, these organizations should have been equipped with adequate human resources, financial support, knowledge, and skills to perform their tasks. However, the government did not allocate enough of its budget to conducting and executing disaster-related programs. People assigned to those organizations were also often second tier in terms of quality and were thought of as being in a kind of exile. They lacked the capabilities and motivation needed for handling a disaster.

Third, the existing organizations were not be able to coordinate activities with various related sectors, such as agencies for education, infrastructure, agriculture, and health. In fact, the disaster management efforts required coordination among local agencies involved in educating people, building roads, and shelter settlement.

Fourth, the operational procedures adopted by those organizations during the emergency situation should not have followed the ordinary rules of bureaucracy. There was no difference in the way tasks were approached during the emergency versus how they would have been approached under ordinary conditions.

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2 Ibid

3 Satuan Pelaksana is the Executing Unit.

4 Satuan Koordinator Pelaksana is the Coordinator of the Executing Unit.

5 Badan Koordinasi Nasional Penanggulangan Bencana (Bakornas PB) is the National Coordinating Agency for Disaster Management.
circumstances. All rules and regulations had to be followed by all organizations, regardless of circumstances. For example, in procuring goods and services, all bureaucracies had to follow the rule of procurement based on Presidential Decree No. 80/2003, making it very difficult to meet urgent needs for goods and services.

The Damage and Response

It was Saturday, 27 May 2006 at 05:53 a.m. when an earthquake of magnitude 5.9 on the Richter scale devastated the area of Bantul and other parts of Yogyakarta. Few people in Yogyakarta had ever experienced an earthquake prior to this, as the last earthquake to have occurred in the area struck on 23 July 1943. The earthquake’s occurrence in a relatively stable area of Yogyakarta demonstrated the capacity of the government to manage a disaster. The Head of Bantul Regency was shocked, and did not know what to do to deal with the impacts of this extraordinary event. The cause was clear: the district government had not been equipped with a clear organizational structure that could help local officials quickly conduct emergency response activities.

The response from the central government was very fast. However, the presence of the presidential office in Gedung Agung Yogyakarta and the direct order of the president to local government officials to develop policies for handling the emergency confirmed the weaknesses of existing mechanisms. If effective disaster management mechanisms had been established and functioning at the local level, the president would not have had to issue such a decree.

The quality of governance is an important part of disaster management as it relates to disaster response. Unfortunately, during the early emergency response phase, many problems occurred as a result of poor coordination among institutions. There was no information on what people were doing in the disaster area. When the earthquake struck, a number of people and institutions came together to give assistance. Many volunteers from NGOs, community organizations, and private companies went to work on their own. People willing to help victims came out carrying extra food for victims.

First, there was no coordination of the distribution of aid, and food, medicines, and clothes ended up being delivered only to certain areas. In some areas, many people received plenty of packages of instant noodles and boxes of cooked rice, and ate more than five times a day because of the certainty of whether they would have food to eat in the coming days. On the other hand, many other areas received no food or clothing assistance at all. Those who distributed the supplies only reached areas near the main roads, neglecting people in more remote regions.

Second, data collection on damage and victims was not well coordinated. Each organization conducted surveys to obtain data on the degree of damage, number of victims, number of family members, number of children under the age of five, number of elderly people, and other information. University students came to classify the damage sustained by houses, while other institutions, such as military officers, came to do the same. The local agency for educational affairs was interested in collecting information on the number of children who could not attend school, but the local agency for health affairs was also collecting similar information for other programs. Consequently, people who had been asked several times about their situations and were promised money or material assistance, became angry when the assistance they were led to expect did not materialize.

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6 The earthquake resulted in 4,710 deaths and severely damaged 202,922 houses.

7 That earthquake caused about 2,000 deaths.

Third, programs offered by the local government and central government were chaotic. The fast response of the central government, which indicated that it would provide Rp 5-30 million for each family without consulting with the local governments, led to vertical and horizontal conflicts. The central government did not have enough money to keep its promise once it learned just how many houses had been totally destroyed. The local governments, meanwhile, found it difficult to answer questions coming from the community regarding requests for the promised assistance, since they had no budget for providing such financial aid. At the grass-roots level, conflicts among community members who struggled to get access to the money intensified.

Fourth, the values of the damage estimates did not match the budget proposal values. Table 3.20 shows that the damage to public services was estimated at Rp 4,440 billion, but the budget for rebuilding this sector was Rp 9,279 billion.

<table>
<thead>
<tr>
<th>Programs</th>
<th>Damage Estimate</th>
<th>Budget Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Billion</td>
<td>%</td>
</tr>
<tr>
<td>Housing and settlement recovery</td>
<td>13,915.00</td>
<td>61.2%</td>
</tr>
<tr>
<td>Public service recovery</td>
<td>4,440.00</td>
<td>19.5%</td>
</tr>
<tr>
<td>Local and community economic recovery</td>
<td>4,396.00</td>
<td>19.3%</td>
</tr>
<tr>
<td>Total</td>
<td>22,751.00</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Rencana Aksi Rinci dan Perkiraan Kerusakan dan Kerugian, 2006°

**Strategy and Current Status**

After the disaster in Yogyakarta and Central Java, the Indonesian government issued Presidential Decree No. 9/2006 promulgated on 3 July 2006. This decree established a coordinating team for the rehabilitation and reconstruction of DIY and Central Java. At the operational level, several Ministerial Regulations were issued following the Presidential Decree:

- Minister of Public Works Regulation No. 19/PRT/M/2006 on Guidance on Post-Earthquake Rehabilitation and Reconstruction
- Bank Indonesia Regulation No. 8/10/2006 on Special Treatment for Bank Credit
- Minister of Finance Regulation No. 71/PMK.06/2006 on Procedures for Eliminating Government Inventories
- Minister of Finance Regulation No. 92/PMK.03/2006 on Land and Building Tax Reduction.

At the provincial level, the governor of DIY also issued several gubernatorial decrees following the ministerial regulations. These included degrees establishing a rehabilitation and reconstruction implementation team, establishing a rehabilitation and reconstruction facilitating team, and providing for operations guidance.

After one year, the Indonesian government established a new law, called Law No. 24/2007 on Disaster Management, which was promulgated on 24 April 2007. It was finally ratified by the parliament after a very long process involving various stakeholders: the government (Bakornas, Department of Social Affairs, Department of Health, Department of Law, National Planning Agency Board), parliament, NGOs (MPBI, WALHI, PA PSDA, JKLPK, YKAI, KRHN, Kehati, AMAN, Care International, OXFAM, UNDP), and university scholars.

Based on the new law, the government has to establish Badan Nasional Penanggulangan Bencana (BNPB/National Agency for Disaster Management) at the national level, and a Badan Penanggulangan Bencana Daerah (BPBD/Regional Agency for Disaster Management) at the provincial and district levels. These organizations are responsible for managing disasters with new perspectives, shifting from emergency response only to disaster risk reduction management.
The central government has followed up on the new law with the creation of five government regulations (Peraturan Pemerintah) and two presidential decisions regarding technical guidance, such as: Government Regulation No. 21/2008 on the Administration of Disaster Management; Government Regulation No. 22/2008 on the Disaster Financing and Management of Funds; Government Regulation No. 23/2008 on the Participation of International NGOs and Donors. In addition, the Ministry of Home Affairs issued Permendagri No. 27/2007 on the Guidance of Preparing Infrastructure in Managing Disaster and Permendagri No. 33/2007 on General Guidance on Disaster Mitigation.

- The current status of governance in Yogyakarta is progressing. The awareness of local governments of the need to improve their disaster management practices has improved. The provincial government has been working continuously and has achieved several results:
  - The Regional Long Term Development Plan (RPJMD) has been revised to accommodate the issue of disasters.
  - A forum on PRB (Forum Pengurangan Risiko Bencana/Disaster Risk Reduction Forum) has been established.
  - A series of activities (FGD and workshops) to incorporate the PRB document into the RPJMD has also been initiated.
  - Jasa Informasi Bencana Indonesia (JIBI) or the Information Service on Indonesian Disasters has been established and can be accessed online.

At the moment, efforts to establish the BPBD are starting with the writing of an academic paper presenting the argument for establishing the new institutional framework. The draft was presented on 30 July 2009 to get input and comments from various local agencies, NGOs and scholars, and will be sent to the Department of Home Affairs and Local Assembly in August 2009.

This new BPBD is expected to serve three functions: coordinator during normal situations, and executor and commander during the emergency response and recovery process. As a coordinating organization, BPBD can ask other institutions to conduct programs related to disaster preparedness and mitigation. As an executing organization, BPBD will conduct certain activities that are not the responsibility of other institutions. And as a commanding organization, BPBD can mobilize resources from other institutions such as the military, police, and hospitals when needed. In the case of Yogyakarta, the proposed format of the organization will be headed ex-officio by the regional secretary (Sekretaris Daerah).

At the district level, the progress that has been made in the development of a regional institutional framework varies by district.

- Gunung Kidul has assigned disaster management tasks to the Badan Kesatuan Bangsa, Politik, Perlindungan Masyarakat dan Penanggulangan Bencana. This district also has a RAD and RPB (Rencana Penanggulangan Bencana/Disaster Management Plan). Since the RPJMD was ratified in 2005, it did not include issues related to disasters. However, disaster management has been introduced into the Musrenbang (Musyawarah Perencanaan Pembangunan/development planning consultation), as part of the annual development plan.
- Bantul has revised its RPJMD to include disasters among the strategic issues that have to be handled. A disaster management division has been accommodated under the Badan Kesatuan dan Perlindungan Masyarakat.
- Kulon Progo is still preparing a local regulation draft for establishing a BPBD. The draft is intended to follow Law No. 24/2007 requiring the establishment of BPBD at the district level. The district also has a RAD and has revised its RPJMD. At the moment, the division of disaster management is positioned under the Badan Kesatuan Bangsa dan Perlindungan Masyarakat.
- Sleman has a RAD and has revised its RPJMD by combining two programs: disaster mitigation and infrastructure improvement. The division of disaster management is currently under Dinas Pengairan, Pertambangan dan Penanggulangan Bencana Alam. However, in January 2010, the division will be moved to the Badan Kesatuan Bangsa dan Perlindungan Masyarakat. In anticipation of future disasters, the district of Sleman has been assisted by the government of...
New Zealand in the installation of an Early Warning System in Kaliboyong, microzonation efforts, and smart box use.

**Challenges and Advantages**

Although the new law on disaster management has been established, it will not automatically solve the existing problems. There are several challenges that remain to be addressed with regard to implementation.

First, there is no link between the local autonomy principles introduced in Law No. 32/2004 on Regional Governance and the principles of Law No. 24/2007. The principle of autonomy has often been abused by ideas forced upon local governments by other laws. For example, all local governments are required to establish Badan Penanggulangan Bencana Daerah. However, Government Regulation No. 38/2007 on the division of roles between the central, provincial, and district governments issued on 9 July 2007 does not mention disaster management as a task to be handled by the local governments, as stated in Law No. 24/2007 ratified on 24 April 2007. Delegation of authority among different levels of government was not clear.

Second, there is no subsidiary principle suggesting that all matters ought to be handled by the smallest (or, the lowest-level) competent authority. In managing a disaster together based on the principle of autonomy, a central authority should have a subsidiary function, performing only those tasks which cannot be performed effectively at a more immediate or local level. In many cases, the roles of central and provincial governments are still too strong vis-a-vis the district government.

Third, the mandatory task of establishing Badan Penanggulangan Bencana Daerah uniformly at the provincial and district levels is problematic. This issue is debatable since each local government has a different level of disaster risk. The areas that have a higher level of disaster risk may establish a Badan with a large structure, whereas areas with moderate disaster risk may need only a smaller office, and areas with low disaster risk may need only a smaller disaster unit. The problems faced by each region are different, and each has their own priorities with regard to issues they view as more important than disaster management, such as poverty alleviation, health, and education. The size of the institutional structure should be based on the needs and priorities of each local government.

Fourth, the ranking format is very problematic. As stated in Law No. 24/2007 (version no. 18), the agency for managing disasters at the provincial level is to be chaired by a local official of one grade below the governor, or similar with rank 1b; whereas at the district level, it is chaired by someone of rank 2a. On the contrary, Government Regulation No. 41/2007 on Local Government Structure issued on 23 July 2007 states that rank1b is for the regional secretary (Sekretaris Daerah) of the provincial government and rank 2a for the regional secretary of the district government. Ranking the head of an agency (Badan) at a level similar to the regional secretary may create "twin suns" that result in a conflict of leadership.

Even looking at the conflicting issues, there are still many advantages to having the new law on disaster management. Local officials are now more concerned with the need to reduce disaster risks by improving the existing institutional structure. A number of adjustments have been made by the local and central governments to minimize the conflicts among various laws and regulations. The constraints they face do not stop them from looking for the best solutions at the local level.

**Lessons Learned**

Coping with disasters requires the improvement of governance for the management of complex problems. Poor governance among different organizations has led to weak coordination in the distribution of supplies and collection of data during emergency situations, and weak implementation of programs during the rehabilitation and reconstruction processes. Laws and regulations are needed to serve as umbrellas that protect all stakeholders involved in disaster management. However, consistency among laws and regulations is essential to ensure that all government officials can work safely together.
CASE 3.3.1. The Role of Universities in Recovery Programs

NIZAM
Research Center for Engineering Science, Gadjah Mada University, Initiator and Coordinator of POSYANIS

Introduction
Looking back at the historical record, the 2006 Yogyakarta Earthquake does not appear to be an exceptional case in Indonesia, since several major earthquakes have rocked the region in the recent past. Historical records indicate that in 1867, a major earthquake damaged 372 houses damaged and killed five people, and in 1943 at least 213 people died and 2,069 were injured as the result of a tectonic earthquake.

Although many major earthquakes had rocked the region before, everyone was shocked and many did not know what to do when the May 2006 earthquake struck. The people of Yogyakarta and Central Java, especially those in the northern part of the city, were fully alert and expecting an impending natural disaster, but the disaster they were expecting was a volcanic eruption from Mount Merapi. Evacuation and rescue operation plans were already in place in anticipation of a volcanic eruption, as the active volcano had started showing signs of higher intensity activities in early 2006. There were not, however, any mitigation measures or preparedness plans in place for an earthquake disaster. Lacking any earthquake preparedness measures or response plans, the scene was rather chaotic in the first 24 hours after the quake.

Under such circumstances, people tend to rely on the existing social infrastructure. Fortunately, social cohesion in the region is relatively high, and the people actively worked to help one another until a more structured rescue operation could be coordinated and deployed. As part of its local community, Gadjah Mada University (UGM) responded accordingly. On the very first day of the disaster, faculty members launched their own coordination effort to mobilize staff, volunteers, and students to help with rescue operations. As one of the oldest and largest state universities in Indonesia, and with a student body of around 50,000, UGM is very much a part of the social and cultural life in the area. It therefore took a leading role in mobilizing resources to assist the local government agencies and local communities to regain their capacity and fulfill their roles. In addition to UGM, many other leading universities in the region also mobilized their resources to assist with rescue operations. UGM continues to play a role in the rehabilitation and reconstruction phases of the disaster.

Immediate Response from the University
Yogyakarta is also known as a city of education because there are many institutions of higher education in the small province. With a population of only 2.7 million, there are more than 100 institutions of higher education that enroll around 250,000 students from all over the country. Thus, the role of the universities in all aspects of social life is very important, especially during difficult times such as an earthquake disaster. Although its buildings also sustained some damage, and some of its staff and students were affected by the grief caused by the disaster, UGM responded immediately after the earthquake to support the local government and victims through the following measures (UGM Team, 2006 and other sources):

- Deployed medical teams to the most needed locations.
- Set-up a disaster crisis management team headed by the Vice Rector for Cooperation.
- Coordinated with the Provincial and District Disaster Coordination Units (SATKORLAK and SATLAK) in two areas of assistance: field activities and advisory services for logistics/distribution and grant accounting.
- Supported the Coordinating Ministry of Economic Affairs in the preliminary physical and economic damage assessment.
• Liaised with other universities, organizations, and individuals to coordinate a concerted humanitarian and reconstruction effort.
• Established field operation centers.
• Mobilized and deployed staff and students to assist with humanitarian rescue operations.

In terms of the infrastructure, the university staff and students conducted programs to support the local government and the community on the following:

• Assessment of the safety of still-standing public buildings such as hospitals, schools, offices, and markets, to ensure their safety.
• Assistance with the distribution of supplies, the provision of emergency clean water, and the sanitation system.
• Assistance with the coordination of humanitarian assistance from NGOs and donor agencies.
• Dissemination of information on the disaster and on disaster mitigation efforts through field training.
• At the peak of the effort, UGM alone was able to mobilize no less than 10,000 students to assist with the rescue operations and provide other humanitarian assistance.

The Reconstruction

One of the major causes of heavy casualties in the recent earthquake was the poor quality of community housing, most of which was constructed using bricks and mortar with poor construction and inadequate reinforcement. Since housing insurance is uncommon, the poor families who lost their houses were the ones that suffered most. Considering the extent of the calamity, the Indonesian government promised aid to families who had lost their homes so they could rebuild. In consultation with the provincial governments of Yogyakarta and Central Java, the government decided to conduct the reconstruction of 180,000 severely damaged houses through a community-based approach. The governor of Yogyakarta Special Province had declared that the government support for the reconstruction of the survivors’ houses would be conducted without the use of professional contractors. Instead, cash support would be given directly to homeowners through a community-based reconstruction effort. This was a bold step taken by the government to promote a bottom-up approach to rehabilitation and reconstruction. By directly supporting the community in the reconstruction of their houses, the government empowered the community to be more self-reliant. On the other hand, the community needed carefully planned support to ensure that the resulting reconstruction and rehabilitation would result in safer buildings and a more resilient community. There is no precedent in post-disaster reconstruction for the community to have such an important role in the direct management of reconstruction efforts while other efforts are made to ensure that the rebuilt houses are safer than previously built houses.

The delivery of funding support was done through community groups (kelompok masyarakat, POKMAS). Since most of the people in the devastated area of Yogyakarta and Jateng are farmers and laborers, they do not have adequate (let alone formal) training in construction practices. To support the community, the government provided facilitators to give needed technical and social support to the community. The facilitators consisted of senior facilitators, social facilitators, and technical facilitators. Senior and social facilitators were responsible for the establishment of community groups of disaster victims, the POKMAS, which would receive the funding from the government, while the technical facilitators were responsible for assuring that the funding provided would result in safer and more earthquake-resistant houses built by the community.

With a very short time to prepare for the needed support, there were many important issues to be addressed. These included capacity building at all levels, the development of support mechanisms, and quality control for earthquake-resistant designs. In this process, the role of university was very important. Given the need to build the capacity of a large number of people in a very short period of time, a strategy needed to be developed. UGM recognized that the community needed technical support and training on the practical aspects of building earthquake-resistant housing, while the
government needed to establish a system to facilitate and control the process to assure the quality and products of the reconstruction effort. The Faculty of Engineering at UGM established a technical support unit called POSYANIS (Pos Pelayanan Teknis, Technical Support Unit) to assist and support government policies related to the community-based reconstruction effort. POSYANIS was established in the first week after the earthquake to mobilize students and staff in assisting with building safety assessment. Upon realizing that many of the victims had already started to try rebuilding their destroyed houses on their own, without any technical knowledge or know-how related to earthquake-resistant building design, POSYANIS established a unit that could provide technical information and guidelines that would be easy to understand and implementable by the community. An instrument was needed to ensure that self-constructed houses met the earthquake safety requirements. The technical guidelines had to be made as simple to follow as possible considering that the users would be laypeople with minimal to no technical qualifications.

In fact, starting the first day after the disaster, the university staff and students were already on task at ground zero to help with the rescue process. Within one year after the disaster, more than 100,000 houses had been completed in Yogyakarta and within two years, practically all of the housing reconstruction had been completed.

**Reviews and Evaluation**

With support from JICA, POSYANIS implemented a pilot program based on activities already being conducted to assist with the reconstruction process. The objectives of the program were as follows:

- Support the local government to develop a system of technical assistance/support for the community to be able to handle the reconstruction process (especially to ensure the implementation of earthquake-resistant construction for houses and infrastructure facilities).
- Assist Bantul Regency, which was the most heavily damaged region, through the Public Works Department in issuing building permits to ensure safety and cultural sensitivity.
- Develop a support system at the sub-district level dealing with building guidelines.
- Directly assist the community in reconstructing their housing using better methods by providing training, public education, and prototyping.
- Develop a resilient community through participatory reconstruction.

The program was implemented through several activities which were grouped into the following sub-programs:

- Establishment of POSYANIS in Bantul Regency to support building permit issuance for public buildings such as hospitals, clinics, schools, markets, and mosques, as proposed by donors.
- Establishment of POSYANIS in 17 sub-districts of Bantul to provide support to the people of those sub-districts in preparing their housing reconstruction and issuing building permits to meet earthquake-resistance standards.
- Implementation of mobile housing clinics and public education on earthquake-resistant buildings and public health to serve the needs of the community. The mobile housing clinic would move from one sub-district to another to provide training, assistance, and advocacy services, and to disseminate information to the community on housing and infrastructure.

Many of the victims also lost their livelihoods, since houses served as the workplaces of those involved in home industries. UGM therefore felt it was necessary to address the revival of home industries as part of the reconstruction process. In addition to the programs above, several pilot revitalization programs were implemented as follows:

- Revitalization in Kasongan Village (Kasihan sub-district): Revitalize small and medium-sized enterprises (SME) in the pottery industry.
• Revitalization in Trimulyo Village (Jetis sub-district): Train construction workers in the skills needed to construct earthquake-resistant housing and hold construction workshops on how to make building components for earthquake-resistant buildings using recycled and new materials.

• Revitalization in Kotagede (Kotagede sub-district): Provide detailed plans for cultural heritage restoration.

POSYANIS launched its efforts by evaluating existing building standards and guidelines related to non-engineered buildings. One of the more feasible approaches to controlling the quality of building construction was through the use of building permits issued by the District Office of Public Works Department (DPU, Dinas Pekerjaan Umum). In coordination with the local government and DPU, an express building permit system was established not only to address administrative issues, but more importantly to address technical issues. By controlling building quality through building permit issuance, the government expects to achieve the self-construction of more than 200,000 houses that meet the earthquake-resistance requirements. To meet the need to issue building permits for large numbers of applicants while maintaining some control over the building process, an information system (which was not available after the Yogyakarta quake) is needed. Instruments for assessing the quality of the buildings and controlling the implementation of the express building permit issuance system also need to be developed. Once the instruments and mechanisms are ready, dissemination of information is facilitated. The operation of the express building permit and assessment system were conducted through the mobile housing clinic program. Through a series of trainings conducted day and night, 54 villages in the 17 sub-districts were covered within a relatively short period of time.

Lessons Learned

Community-based reconstruction can be an effective approach to reconstruction from a major disaster. If properly planned, such an approach can strengthen social cohesion and enable people to develop a more resilient community. However, such an approach requires technical and management support that should already be in place.

Universities can play a major role in all stages of recovery from a major disaster, from emergency rescue to reconstruction and rehabilitation. Using their competencies and resources, universities can assist the local government in managing the emergency response and reconstruction process, facilitate the distribution of humanitarian aid to victims, and directly assist the community through capacity building and other tangible activities.

Concluding Remarks

• Social cohesion is a prerequisite for an effective community-based reconstruction program.

• Universities can play an instrumental role in developing a resilient society.

CASE 3.3.2. The Post-Tectonic Earthquake Response in Bantul Regency, Yogyakarta

FENTY YUSDAYATI

Regional Development Planning Board (Bappeda) Bantul, Yogyakarta Province

Introduction

Bantul Regency has an area of about 506.8 km², and a population of 829,577 (as of 2006). It consists of 17 sub-districts and 75 villages. In the earthquake of 27 May 2006, nine of its 17 sub-districts were heavily damaged, four sustained moderate damage, and four sustained minor damage. The destruction was recorded in terms of the number of buildings damaged, the damage to infrastructural facilities, and the number of fatalities.

The number of people affected was 31,045, including 4,280 dead, 13,840 seriously injured, and 12,925 with minor injuries. A total of 216,804 or 90% of the homes in Bantul Regency were damaged, with
71,763 totally destroyed (ruined), 71,372 heavily damaged, and 73,669 lightly damaged (data from 7 June 2006).

Damage was also sustained by public facilities, such as government offices, trade centers, traditional markets, health centers, and education buildings. Most of the public buildings located in the affected sub-districts were destroyed as well. Of the 30 traditional markets in Bantul, five sustained serious damage, 15 sustained moderate damages, and three sustained minor damage. As many as 50 health facilities, such as medical service centers, spread throughout the sub-districts were damaged. Records indicate that 286 elementary school buildings sustained serious damage, 67 sustained moderate damages, and 67 sustained minor damages.

In addition to the collapse of health and education facilities, infrastructural components such as roads, bridges, and irrigation networks were also damaged. The damage to roads and bridge was due to degradation. In spite of this damage, the roadways are still functioning well.

Most of Bantul Regency’s residents make their living as farmers, small entrepreneurs (home industry workers), and craftsmen. The earthquake caused many residents to lose their source of employment. Many dwellings that functioned both as home and workshop were ruined, along with the equipment used for conducting business. While the earthquake did not directly destroy the farms or agricultural crops of farmers, some fields were damaged due to the collapse of buildings, thousands of meters of the irrigation network were damaged, and many farmers lost their estates, equipment, seed warehouses, and mow.

![Map of earthquake damage in Bantul Regency](image)

**Figure 3.61 Map of earthquake damage in Bantul Regency**

**Magnitude of the Problems**

The problems faced by society and government at the time of the earthquake and in the recovery process were as follows:

**Physical Aspects**

- Earthquake-affected area was spread across the region and settlement areas were isolated (far from main roads)
  Many residential settlements are stretched, making some inaccessible. It was difficult for residents in these areas to seek help.
- Earthquake occurred in a high density area
- Buildings are crowded together, lack of open space
  When the earthquake struck, some people fled their homes only to become victims of collapsing buildings nearby. Residential neighborhoods are congested and offer relatively narrow access.
- Improper construction (inadequate safety standards in building construction)
Permanent buildings with brick walls did not meet safe-building standards and did not fulfill the conditions required for earthquake resistance. Residents were unable to meet such construction standards due to their limited understanding of the issue and budget constraints.

- Limited public equipment and facilities for post-earthquake response
  - Limited vehicles available to transport victims to health centers.
  - Limited health facilities (rooms, equipment, medical professionals). Many health centers were damaged. The needs of victims, both those with serious and minor injuries, could not be addressed quickly.
- Undeveloped disaster response system
  - Even though rescue teams were present, they were unprepared to handle such an unpredictable disaster.
  - Government officials had not been trained in handling emergency situations.
  - Limited public equipment and facilities available for the post-earthquake response.
  - Limited vehicles available to transport victims to health centers.
  - Limited health facilities (rooms, equipment, medical professionals). Some health centers were damaged. Hospitals could not accommodate the large number of victims.

Non-Physical Aspects

- Limited disaster awareness among the general public
  - People panicked when earthquake struck.
  - Residents had not stocked up on the practical supplies needed in case of an earthquake emergency, such as tents, food, and medicines.
- Victims of trauma need healing
  - Anxiety caused by aftershocks
  - Fear of entering buildings/houses (especially common among children).
  - Adults experienced depression upon seeing the wreckage of their houses/workplaces (especially for workers of small home industries).
- Limited equipment and ability of the government to respond to the earthquake
- Limited medical professionals and equipments.
- Limited labor power and equipment to clean up the building wreckage.
- Lack of medical expertise for addressing the psychological trauma suffered by earthquake victims.

- Limited government funds

A large amount of money was needed to help the victims of Bantul Regency (223,117 families or 779,287 people) execute rescue and recovery activities. The response and rescue process required expenditures for food, medicine, and temporary shelter. The limited funds of both the central government and local government made it difficult to deliver aid effectively.

**The Post-Earthquake Response**

The post-earthquake response was not conducted by the government alone. The private sector, NGOs (foreign and domestic), and universities also assisted with the process of rescue and recovery. To prevent overlapping, the response was coordinated by the local government. Coordination meetings were done twice a week during the emergency and reconstruction phase. The phases of the earthquake response can be seen in Figure 3.65 below.

![Figure 3.65 Earthquake Response Phase](image)

**Emergency Phase**

The local government of Bantul was incapable of acting independently in response to the earthquake disaster in Yogyakarta Special Province and Central Java (especially Bantul). Early coordination with the central government was required. The process by which the early response was conducted is shown in Figure 3.66 below.
The implementation of the following initial Earthquake Disaster Response measures was initially led by the head of the local government chief (Regent).

- Rescue of victims and handling of injured persons
- Empowerment of Local Rescue Teams
- Establishment of service centers (coordination posts)
- Distribution of supplies (tents, medicines, etc.)
- Establishment of temporary shelter
- Strengthening of distribution channels
- Updating data on disaster victims (Media Center)
- Assessment of building damage
- Psychological assistance
- Coordination of work programs and information systems
- Transition of development programs into emergency programs
The collection of data from victims and the early assessments of settlement damage were done at the smallest community group level, i.e., by the chiefs of family neighborhoods, hamlets, villages, and districts. Settlement data was validated and updated by the local government of Bantul Regency in cooperation with college students serving as field interns in their respective areas.

Meanwhile, the coordination of aid was centralized in POST I (government official house/the house of Regent), which was responsible both for the acceptance of aid from external sources and for the delivery of aid to earthquake victims.

**Rehabilitation Phase**

- Identification of all earthquake victims and reestablishment of public infrastructures
- Support to help the mentally and physically disabled reestablish their lives
- Acceleration of the delivery of ‘living costs’ (cash aid), restoration of public facilities and homes
- Promotion of local economic development (e.g. simultaneous harvest, delivering equipment for productive economic endeavor, delivering work capital and community development program)
- Provision of tax incentives for land and house tax, building development licenses, redistribution of identification and medical card.
- Control of the price of building supplies (including cement, wood, and metal) and agricultural supplies (such as fertilizer and seed)
- Elimination of the requirement to wear school uniforms for poor families (during the emergency phase), suspension of school costs for elementary school students, distribution of cash aid to the poor
- Dissemination of knowledge about disaster mitigation
- Assistance Desk to accept complaints and input from the community
- Rehabilitation and reconstruction of shelter

As of 20 February 2007: There were 134,198 collapsed/seriously damaged houses, 37,206 houses with moderate damage, and 73,669 houses with minor damage. By the end of 2006, 70,611 collapsed/seriously damaged houses had been rebuilt across 8,692 community groups. The remaining 63,587 collapsed/seriously damaged houses were to be rebuilt in 2007. The criteria for housing aid were:

- The building collapsed or was serious damaged
- The residents had not yet accepted permanent housing aid
- The residents had not yet rebuilt their houses and were still living in tents
- The inhabitant was not a tenant (renter)
- One or more of the residents' family members had died or been seriously injured
- One or more family members is a senior citizen
- The residents have one or more children under five years old
- Other criteria based on community discussions or local wisdom.

To ensure the effective and efficient implementation of the housing reconstruction policy, housing development aid was delivered by the central government as follows:

- Local community groups comprised of 8-15 families were quickly established.
- Data was collected on the houses that fulfilled the housing development aid criteria.
- The requirement for rebuilding a house was as follows: If more than two families lived in one collapsed/serious damaged house, they were only able to get one disbursement of housing development aid.
- If a family whose house had collapsed/been seriously damaged rebuilt that house on their own, that family would still be eligible for housing development aid as long as the house had been poorly built (i.e., still did not meet safe building standards).
Families that had received permanent housing development aid from donors were ineligible to receive housing development aid from the central government.

**Governmental and Social Involvement**

- **Central Government**
  - Delivering aid to cover living costs, rice, and home repairs to victims.
  - Reestablishing public facilities (such as school buildings, local government offices, health centers, markets).

- **Provincial Government**
  - Rebuilding public facilities (such as school buildings, health centers).
  - Coordinating NGOs to distribute aid.

- **Local Government**
  - Collecting data on damage and victims. Data collection was conducted by the RT heads (chiefs of neighborhood groups), chiefs of villages, and chiefs of local districts.
  - Channeling aid from central government in the form of living costs and food (rice), supported by the army and police officers.
  - Rebuilding public facilities, such as education buildings, health buildings, and trade centers (traditional markets).
  - Cleanup of building debris by giving stimulus funds to every RT (neighborhood group), conducted with the assistance of the army/police.
  - Coordinating the collection of aid from domestic and foreign NGOs so that response measures do not overlap or become focused on one location. It was noted that 180 international NGOs, 16 international organizations, 150 domestic NGOs, 14 donor institutions, 15 branch offices of the UN, 18 press/media offices, 14 colleges, and 25 other institutions provided aid for post-earthquake response measures in Bantul Regency.

- **Individuals, private sectors, and universities**
  
  Individuals, private sectors, and universities participated in the following aspects of the housing reconstruction program:
  - Emergency housing
  - Temporary housing
  - Planned temporary housing

**Response mechanism**

The diagram below shows how the response process worked.
Figure 3.67 Working organization and handling concept

Restoration Phase

Rehabilitation and reconstruction were promoted as follows:

- Residents were disappointed by the government’s offer. The central government promised to give aid in the amount of Rp 30 million to every family head. The reduction of this amount caused distrust to government.
- There were missing links in the collected data and differences in the criteria used when collecting data.
- Some organizations had vested interests, both political and economic, in the delivery of aid.

Given this situation, the process of reconstruction was conducted by promoting community involvement and solidarity (togetherness) in society. However, massive programs are usually difficult to conduct according to strict procedures. Therefore, the reconstruction process should be carried out prudently...
considering the costs of recovery. During the post-reconstruction phase, the local government of Bantul Regency launched a Restoration Program whose objective was to reestablish social harmony and to restore the solidarity (togetherness) of the residents. This program will be successful as long as there is goodwill among the people, such as:

- Willingness, courage, and the ability of the community to identify and communicate the problems causing disputes.
- Willingness, courage, and the ability of the community to resolve problems through discussion.
- Willingness, courage, and the ability of the community to maintain a peaceful living environment and create sustainable social harmony.

CASE 3.3.3. Central Government Perspectives on Managing a Large-Scale Post-Earthquake Rehabilitation and Reconstruction Program: Experiences from the Yogyakarta Earthquake

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Introduction

The major earthquake experienced by the Provinces of Central Java and Yogyakarta on 27 May 2006 brought about major changes in the ways governments, both at the national and local levels, pursue development strategies for the region. Given that this calamity took thousands of lives, the resulting collective awareness of the need to develop a disaster-prone region is indeed a blessing. The concluding report of the National Technical Team that oversaw the rehabilitation and reconstruction process in both provinces indicates that the earthquake caused more than 5,700 deaths and heavily damaged nearly 260,000 houses.

Table 3.21 Earthquake Victims and Housing Damage

<table>
<thead>
<tr>
<th></th>
<th>Yogyakarta Province</th>
<th>Central Java Province</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Casualties</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death</td>
<td>4,697</td>
<td>1,063</td>
</tr>
<tr>
<td>Serious injury</td>
<td>10,775</td>
<td>18,502</td>
</tr>
<tr>
<td>Minor injury</td>
<td>7,862</td>
<td></td>
</tr>
<tr>
<td><strong>B. Housing Damage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy damage/uninhabitable</td>
<td>159,731</td>
<td>99,730</td>
</tr>
<tr>
<td>Moderate damage/inhabitable</td>
<td>103,809</td>
<td>104,111</td>
</tr>
<tr>
<td>Light damage</td>
<td>152,716</td>
<td></td>
</tr>
</tbody>
</table>

Source: TTN, November 2007

The report from the National Development Planning Agency BAPPENAS (WB/ADB/UNDP/GoI, 2006) indicated that “though the number of casualties was fortunately lower than comparable disasters, the damage and losses sustained rank this earthquake among the most costly natural disasters in the developing world over the past ten years. Table 3.22 shows that the Yogyakarta Earthquake is the 4th largest and costliest natural calamity to have occurred in the last 10 years in the developing world.

Table 3.22 Major natural disasters in developing countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Disaster type</th>
<th>Date</th>
<th>Death</th>
<th>Damage and losses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(USD Million)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(USD Million, 2006 values)</td>
</tr>
<tr>
<td>Turkey</td>
<td>Earthquake</td>
<td>17/08/1999</td>
<td>17,127</td>
<td>8,500</td>
</tr>
<tr>
<td>Indonesia (Aceh)</td>
<td>Tsunami</td>
<td>26/12/2004</td>
<td>165,708</td>
<td>4,450</td>
</tr>
</tbody>
</table>
### Description of the Program

The most important lessons learned in managing the post-earthquake rehabilitation and reconstruction process in Yogyakarta and Central Java is that all efforts to reduce casualties and promote recovery and development should be focused on the disaster victims, as individuals and members of society. The government decision to adopt a “one-step policy” is an important step toward ensuring that victims return to their normal lives as soon as possible. Under a one-step policy, the emergency shelter program is immediately followed by the initiation of a permanent housing program. In Aceh and Nias, by contrast, a “two-step policy” was adopted, where the government supported the construction of temporary housing (during which victims were entitled to financial support) before initiating a permanent housing program. This was a decision that later created problems when many of the victims claimed the temporary houses as their own, and were reluctant to move to permanent housing as it would mean losing their government financial support. This made it difficult to move the disaster victims into permanent housing. The adoption of a one-step policy also sent a strong signal to the surviving victims that the damage and losses sustained as a result of the disaster would be shouldered both by the government and the communities affected.

The approach was supplemented with funding from non-government sources, such as the Java Reconstruction Fund (JRF) and various UNDP-coordinated NGOs acting to “fill in the gap” during the recovery process. This was also a logical approach given the source of funding, as the Indonesian government provided Rp. 5.4 trillion to support housing rehabilitation and reconstruction (or around 40% of the value of damage and losses in the housing sector), while the non-government sector provided less than 20% of the total budget of the housing recovery program.

A direct comparison of Yogyakarta/Central Java with Aceh/Nias might not be entirely fair given the variations in the cultural and social contexts of these regions. The capacity of local government organizations to respond to disasters is a key consideration in the selection of specific rehabilitation and reconstruction policies. A one-step policy is a reflection of the demand for an accelerated housing recovery process using existing social capital. The additional choice of a community-based rehabilitation and reconstruction program resulted from a combination between the “one-step policy” and the high level of social cohesion that exists in Yogyakarta and Central Java. The experiences of Iran and Pakistan have demonstrated that internal motivation at the local government and community levels is the key to the success of a post-disaster program. The following table summarizes the principles and reasons for adopting a “one-step policy” and community-based rehabilitation program.

### Table 3.23 Basic principles for Adopting a “One-Step” Policy and Community-Based Rehabilitation and Reconstruction

<table>
<thead>
<tr>
<th>Principles</th>
<th>Reasons</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsibility of the victims, the government provides financial support</td>
<td>Focuses on victims</td>
<td>Limited technical skills</td>
</tr>
<tr>
<td>Empowerment through community</td>
<td>Social structure and capital still exist</td>
<td>Requiere supervisión</td>
</tr>
</tbody>
</table>

### Table 3.24 Typical case studies

<table>
<thead>
<tr>
<th>Country</th>
<th>Disaster type</th>
<th>Date</th>
<th>Death</th>
<th>Damage and losses (USD Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honduras</td>
<td>Hurricane Mitch</td>
<td>25/10–8/11/1998</td>
<td>14,600</td>
<td>6,983</td>
</tr>
<tr>
<td>Indonesia Yogyakarta and Central Java</td>
<td>Earthquake</td>
<td>27/5/2006</td>
<td>5,716</td>
<td>1,313</td>
</tr>
<tr>
<td>India (Gujarat)</td>
<td>Earthquake</td>
<td>26/1/2001</td>
<td>2,005</td>
<td>2,600</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Earthquake</td>
<td>8/10/2005</td>
<td>73,338</td>
<td>5,42</td>
</tr>
<tr>
<td>Thailand</td>
<td>Tsunami</td>
<td>8/12/2004</td>
<td>35,399</td>
<td>4,151</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>Tsunami</td>
<td>26/12/2004</td>
<td>16,389</td>
<td>1,224</td>
</tr>
</tbody>
</table>

Sources: Asia Disaster Preparedness Center, Thailand; ECLAC, EM-DAT, World Bank
<table>
<thead>
<tr>
<th>Principles</th>
<th>Reasons</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equality among members regarding rights and obligations</td>
<td>Local government structure is still functioning</td>
<td>Issues of integration into regional plans, including disaster-prone regions</td>
</tr>
<tr>
<td>Group dynamics</td>
<td>Government budget limitations</td>
<td>Complementary support from donors is still required</td>
</tr>
</tbody>
</table>

The principles illustrated in table 3.23 imply that when adopting a “one-step policy” for rehabilitation and reconstruction, relevant national and local government agencies need to develop and implement risk mitigation measures to ensure the success of the policy. These efforts were carried out by the government under the leadership of the National Technical Team, with support from various international and local organizations. Such joint coordination is critical to ensuring that risks are well mitigated and principles are well addressed.

It is important to note that the rehabilitation and reconstruction concept is aimed at the goal of “building back better.” This concept implies that the programs will help improve (1) the quality of housing and other buildings, (2) the quality of settlements and building administrative procedures, including those involving building permits, (3) the sustainability of post-disaster economic development, and (4) accountability in the rehabilitation and reconstruction process.

Figure 3.68 Housing rehabilitation and reconstruction progress (January-June 2007) Source: TTN Monthly Report, June 2007

There are several ways to ensure compliance with the above concept, including the involvement of governmental internal auditors and the implementation of QA/QC (Quality Assurance/Quality Control) measures. For example, the results of QA/QC measures in housing reconstruction in November 2007 indicated that 96.7% of the houses were constructed with the assistance of engineering facilitators, and 68.75% of the recipients of government support rebuilt their houses with a better quality than was initially required. A technical examination of the reconstructed houses indicated that 86.7% met more than 70% of the required criteria for earthquake resistance, and only 7% complied with all required criteria. This indicates that there is still considerable need to implement continuous quality improvements in housing.
The experiences of Yogyakarta and Central Java have taught us that there are several important factors in any post-disaster rehabilitation and reconstruction program, namely (1) implementation regulations, (2) coherent policies between the national and sub-national governments, and (3) adequate operational guidelines. The capacity of local governments to develop an approach to reconstruction tailored to their area, as well as to interpret national policies and translate them into operational guidelines, is critical to success.

![Heavily damaged house components](image)

Table 3.24 Aspects and Components of a Successful Rehabilitation and Reconstruction Program

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical and administration plans for</td>
<td>Identification and categorization of damage</td>
</tr>
<tr>
<td>rehabilitation and reconstruction</td>
<td>Formation of community groups</td>
</tr>
<tr>
<td></td>
<td>Dissemination of information on government support policies and program</td>
</tr>
<tr>
<td></td>
<td>Administration of financial support</td>
</tr>
<tr>
<td></td>
<td>Accounting for disbursements to recipients, agreements, and disbursement</td>
</tr>
<tr>
<td></td>
<td>mechanisms</td>
</tr>
<tr>
<td></td>
<td>Building permits</td>
</tr>
<tr>
<td></td>
<td>Fund distribution and channelling</td>
</tr>
<tr>
<td></td>
<td>Quality assurance and supervision</td>
</tr>
<tr>
<td></td>
<td>Recruitment of facilitators: qualification, training, implementation</td>
</tr>
<tr>
<td></td>
<td>Corrective action in case of quality non-compliance</td>
</tr>
<tr>
<td>Human resource support</td>
<td>Availability of facilitators (engineering and non-engineering)</td>
</tr>
<tr>
<td></td>
<td>Labor contractors, laborers</td>
</tr>
<tr>
<td></td>
<td>Logistical support for building materials</td>
</tr>
<tr>
<td>Coordination and information system support</td>
<td>Policy coordination system</td>
</tr>
<tr>
<td></td>
<td>Technical coordination system</td>
</tr>
<tr>
<td></td>
<td>Monitoring and reporting system, i.e. progress, costs, problems, complaints</td>
</tr>
<tr>
<td></td>
<td>Operational policy information coordination system</td>
</tr>
<tr>
<td></td>
<td>Spatial coordination of activities (WWW: Who does What Where?)</td>
</tr>
<tr>
<td></td>
<td>Public outreach using printed materials (bulletins, newsletters, posters,</td>
</tr>
<tr>
<td></td>
<td>newspapers, magazines, disclosed reports) and electronic media (radio,</td>
</tr>
<tr>
<td></td>
<td>television, website)</td>
</tr>
<tr>
<td></td>
<td>Information storage and retrieval system</td>
</tr>
<tr>
<td>Community-based non-housing post-disaster</td>
<td>Recovery of community-based local infrastructure</td>
</tr>
<tr>
<td>program</td>
<td>Recovery of macro-economic conditions (economic growth, unemployment,</td>
</tr>
<tr>
<td></td>
<td>inflation)</td>
</tr>
<tr>
<td></td>
<td>Social and economic recovery:</td>
</tr>
<tr>
<td></td>
<td>Small and medium-sized enterprises</td>
</tr>
<tr>
<td></td>
<td>Social and psychological counseling (orphans, elderly, disabled)</td>
</tr>
<tr>
<td></td>
<td>Disaster risk reduction (spatial plan, preparedness training)</td>
</tr>
<tr>
<td></td>
<td>Provision of technical service units (building and public services)</td>
</tr>
<tr>
<td>Reliable and verified information</td>
<td>Establishment of a National Technical Team in the affected regions to serve</td>
</tr>
<tr>
<td></td>
<td>as a representative of central government organizations</td>
</tr>
<tr>
<td></td>
<td>Responsive local government agencies</td>
</tr>
<tr>
<td></td>
<td>Utilization of spatial/geographical information system to assist in</td>
</tr>
<tr>
<td></td>
<td>appropriate decision making</td>
</tr>
</tbody>
</table>
With the end of the rehabilitation and reconstruction program in July 2008, several questions remain:

- How can the local community be better prepared to overcome future disasters?
- What can national and sub-national governments do in the field of disaster mitigation and preparedness?

The recently established Law No. 24/2007 on Disaster Management triggered by the tsunami in Aceh and the earthquake in Yogyakarta responds to the above questions by establishing principles and stipulating policy directives for the management of future disasters. The new law also implies that a long-term regional plan should establish disaster risk reduction as a core component of regional and local plans. Previous regulations, such as Presidential Decree 106/1999, 03/2001, 111/2001 and Presidential Regulation 83/2005 were developed around the concept of emergency response. The new law shifts from a reactive approach to a proactive approach to intervention in disaster management. It also emphasizes the principle of a coordinated policy under the newly established National Agency for Disaster Management. The law also calls for coherence in planning guided by Law No. 24/2007 on Disaster Management and Law No. 26/2007 on Spatial Planning. Any new spatial plan should incorporate a disaster risk identification and assessment, disaster analysis, and risk mitigation planning. Those new planning methodologies require new knowledge and capacities, both at academic institutions and more importantly at national and sub-national government levels. As a consequence, the government should mobilize resources to create knowledge partnerships.

**Lesson Learned**

Two years of experience in managing the large-scale post-disaster rehabilitation and reconstruction efforts in Yogyakarta and Central Java, as well as the enactment of Law No. 24/2007 have opened up new horizons and broadened our perspectives on the need to mainstream our understanding of disaster and disaster management. There are several lessons that have already been learned by governments at all levels. Those lessons should be utilized and shared by other local governments to help them prepare for the next disaster. Some of those important lessons are as follows:

- Every post-disaster intervention, both by government agencies and NGOs, should be able to guard, utilize, and strengthen existing social institutions and their values, norms, networks and mechanisms.
- Disaster-sensitive governance in both upper level policy formulation and local level operations should be developed by involving and strengthening existing stakeholders and their network of cooperation and collaboration.
- Concerted efforts in humanitarian aid and recovery should be encouraged and if necessary, enforced.
- Activities to safeguard basic needs and secure incomes for affected communities should be a priority.
- The decision-making process should be based on reliable and verified information.

The experiences gained from managing a large-scale rehabilitation and reconstruction program have encouraged the Yogyakarta and Central Java provincial governments to document all the knowledge learned through the implementation process. Currently, both provincial governments plan to establish a Center of Excellence (CoE) in disaster management, especially in disaster risk reduction, that will hopefully benefit the local community in preparing to deal with future disasters. The idea for the center was originally proposed by the Yogyakarta provincial government after recognizing that various governmental and non-governmental organizations have gained a wealth of knowledge in disaster management that should be sustained and shared. The center is also expected to serve as a learning ground where other regions can learn how to manage disasters and reduce disaster risks efficiently and effectively, as well as how to undertake a participatory and well-governed rehabilitation and reconstruction program. By establishing such a Center of Excellence, the lessons from the Yogyakarta Earthquake will have contributed to the Hyogo Framework for Action 2005-2015, especially in terms of
filling in the gaps in knowledge management and education, and preparing for an effective response and recovery.

**CASE 3.3.4. A Case Study of Collaborative Action with NGOs, Individual Donors, and The Private Sector In Providing & Managing Aid and Funding**

**SITI DIFLA RAHMATIKA**

Gaia Foundation (Yayasan Gaia)

**Introduction**

In response to the earthquake disaster in Yogyakarta and Central Java on 27 May 2006, Yayasan Gaia (the Gaia Foundation) carried out a series of social activities for refugees, from the deployment of a mobile clinic (consisting of one vehicle equipped with medical supplies, doctors and volunteers) to remote earthquake locations, to the installation of a station for medical services at a soccer field in Mblali Sub-Village, Seloharjo Village, Pundong District, Bantul Regency. The station, which was initially intended to provide health services to victims, expanded its services to shelters and refugee camps. To support the camp’s expanding functions, the Gaia Foundation invited any willing individuals and organizations to contribute to the effort.

Our team was called Gaiacorps because it involved not only personnel from the Gaia Foundation, but also a range of individuals willing to contribute their time, efforts, and ideas to helping the refugees. During the Emergency Response Stage and over the course of the implementation of several following initiatives, Gaiacorps had been served cumulatively by about 300 volunteers who worked at the Gaia Foundation office (headquarters) and also at the Mblali Camp. The volunteers working at the Mblali Camp were assigned to one of the working group teams: Kampung Tenda (Tent Shelter), Infrastructure, Medical (including the medical center, mobile clinic, and cyclist squad), Education, Transportation, Logistics, Communal Kitchen, Stress Release Initiative, and the Assessment/Mapping Team. All of our activities are recorded chronologically on our blog: http://corps.gaiasol.com/updates/index-e.html.

Instead of working with individuals (donors and volunteers), the Gaia Foundation also teamed up with various companies, groups, and organizations to provide more supplies (medicines, food, clothes, and home necessities). We also distributed other kinds of donations, including cash, vitamins and supplements, hygiene kits, shelters, and rice.

The Gaiacorps coverage area not only included Mblali Village, but also expanded to 33 communities (tent outposts) around 11 sub-villages housing 1,237 families comprised of 4,561 people. Of these, there were 329 toddlers/infants, 728 children, 35 pregnant mothers, and 756 seniors. Our medical services were provided by 15 doctors, 15 medical students, 17 paramedics, and 120 volunteers working in shifts, all posted at Mblali Camp. Since the day of the disaster, 27 May 2006, we have treated more than 1,200 patients (according to the medical records). Gaiacorps continued providing aid until 30 June 2006, then moved into the next phase: development. In this phase the goal was to facilitate the local reconstruction process.
Table 3.25 Demographic & Other Conditions of the Gaia Coverage Area at Seloharjo Village

<table>
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<th>Tents Group</th>
<th>KIT</th>
<th>Under 5</th>
<th>Children</th>
<th>Pregnant</th>
<th>Elders</th>
<th>Family</th>
<th>Lives</th>
<th>Houses</th>
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<td>38</td>
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**Activities Undertaken By Gaiacorps**

Aid Stage: Community Emergency Assistance
The program started on day one of the disaster as follows:
1. Temporary Shelter Development: Set up of a series of tent kampong at 31 outposts, consisting of:
   - 1 main tent kampong
     - 32 family tents
     - 422 individuals, 101 families
     - 8 community latrines/bathing areas
     - public tap water supply from an electrically pumped well
     - medical clinic include facilities for minor surgeries (1,200 medical treatments/records)
     - 1 community tent hall, for community gatherings, meetings, and other social activities
     - 1 children's playground tent, for an informal school & other children's activities
     - 1 volunteer tent
     - 1 community kitchen
     - 1 Gaia office tent
     - 1 warehouse/logistics tent
   - 32 satellite tent kampongs – spread out in 11 sub-villages
     - Bamboo-framed tarpaulin tents
     - 33 community latrines, 13 in cooperation with UNICEF through Yayasan Komunitas Yogyakarta, and 20 in cooperation with Yayasan Dian Desa.
2. Food & Non-Food Supply Distribution: By 30 June 2006 we had distributed various supplies, including:
   • 31 tons of rice
   • 700 tents (big family tents, bamboo framed tarpaulin tents: 16,000 sq. meters tarpaulin)
   • 5,000 liters of bottled drinking water
   • 17,000 packs of instant noodles
   • 500 kgs kacang hijau
   • 750 hygiene kits + 1,600 sanitary napkins
   • 300 kgs milk powder for infants & children
   • 500 kgs white sugar
   • 99 kerosene lanterns
   • Others supplies including shovels, spades, emergency lights, toys, blankets, mattresses, clothes, biscuits, canned food, baby food, etc.

From 15-30 June 2006 (the end of emergency relief stage), the Gaia Foundation, supported by funds from CUSO Canada, covered all of the emergency food and non-food supplies for the target group, including 22 tons of rice, 1,800 kg of eggs, and other foods such as meat, vegetables, fish, tempeh, tofu, and sugar, totaling 220 million rupiahs in value.

- Regular Community Meetings: Twice a day, prior to the daily supply distribution, a meeting was held with local representatives to discuss and coordinate issues, such as any urgent increase in the need for supplies, as well as progress on the reconstruction plan.
- Funding & Volunteering Initiatives: Since day one, 27 May 2006, we recorded the involvement of 353 camp personnel, comprised of 340 volunteers and 13 employees of the Gaia Foundation.
- The wide range of donors that supported us was mostly comprised of individuals who were contacted through short message services (sms), emails, mailing lists, phone calls and our website (http://gaiacorps.blogspot.com), and they contributed tents, medical supplies, food and non-food, as well as cash of Rp 120 million). Cash and in-kind contributions also came from several donor institutions: UNICEF, CRS, CUSO, and both private/government-owned companies.
- Stress Release Initiatives: For 30 days starting 12 June 2006, we initiated a project called Stress Release, which took the form of:
  - Friendly visits by our volunteers to strengthen relationships with local residents, build more intimate relationships, and discuss their hopes and concerns before and after the quake, enabling the community to share their experiences with other people who had not lived through the trauma. Before the visits were conducted, four professional psychologists facilitated and shared their experiences, skills, and competencies in an informal two-day workshop for volunteers.
  - “From Dusun to Dusun”: A series of entertainment programs, regular visits (three times a week), and artistic performances in 8 dusuns by musicians and comedians.
  - “From Mosque to Mosque”: A series of religious programs, regular visits (three times a week), and sermons to the sub-villages to boost and encourage the victims’ spiritually, and also to offer a different perspective on the effect of the disaster on their lives.

Development Stage: Community Settlement Reconstruction Assistance – Initiated By Gaia

1. Mapping, Quick Assessment, & Cooperative Establishment: In cooperation with representatives from each group of tent kampongs and 60 volunteers, the following activities were conducted:
   - Physical Thematic Mapping – A simple mapping of houses in 33 communities (neighborhood cluster units), complete with detailed information about current conditions and damage sustained by houses and public facilities. Including in the mapping area were the community gathering places, the location in each tent kampong commonly used by the locals to conduct meetings with or without Gaia.
   - Community Socio-Economic Quick Assessment – Record about the local residents’ socio-economic conditions, including demographic data, occupations, previous daily patterns related to community participation, and the range of skills that the locals could contribute to any
1. Community-based reconstruction schemes (human resources, bamboo, stone, wood, and other materials).
- The establishment of co-operative (co-op) institutions – At the community level at 33 outposts.

2. Community Settlement Reconstruction Assistance
- Chainsaw Initiative

This initiative came from our belief that the community could construct temporary shelters on their own, using their own property: trees. Privately owned trees could be cut and used to build the main structure of a shelter, but the cutting process would require additional tools, namely, a chainsaw.

Gaia provided a chainsaw unit, which included a chainsaw, table circular saw, and electric planner (including operator), while the community (through co-op management) provided the trees to be cut and processed into wood materials and boards. These would be used as the main materials for housing reconstruction: the house and roof framing, and window and door frames. The walls and roof could be provided by the community themselves, using materials from their former homes (bricks, roof tiles, etc), or made using stitched palm/coconut leaves or woven bamboo (gedheg).

The transitional houses were 4 x 6 meters square, just large enough to protect and shelter one family against daytime heat and cold, windy nights. The construction work was done by the residents with technical assistance from Gaia. Through this chainsaw initiative, wood materials for four housing units could be prepared each day, and by the end of the project, 41 trees had been cut using the chainsaw and 26 temporary housing structures had been erected.

Note on Deforestation & Illegal Cutting/Logging Issues
- Planting trees for construction/hardwood is a traditional long-term investment initiative for most of the Seloharjo people. The trees usually planted for this purpose are coconut trees, teakwood, albasia (sengon), and jackfruit, and they were planted in the residents' own backyards or fields.
- Residents generally use or sell these trees for special occasions, such as to pay for a child's wedding, for the first tuition installment of a child's high school or university education, or for other emergency needs).
- This chainsaw initiative does not violate environmental/forest degradation regulations, since all the trees were purposely planted and utilized as construction materials.
- The chainsaw itself was owned and managed by Gaia. No one could use the chainsaw unit except under the supervision of the Gaia Foundation, and the process used in the chainsaw initiative had to be approved by Gaia and the Co-Op committees. At the end of the project, the whole chainsaw unit was not given to the community, to avoid any illegal or uncontrolled use.

- Bamboo Walls Initiative

Some community members have already prepared their own wood materials using their ruined houses, and thus have been able to erect their own house frames. Their main need now is for walls, but the price of the most appropriate temporary wall material, woven bamboo, is rising, from the usual Rp. 12,000 per sheet (2 x 2.5 meters square) to Rp. 30,000 to Rp. 45,000 per sheet. This price increase created serious problems.

Hence, we started the Bamboo Walls Initiative, through which individual donors provided 1,000 sheets of bamboo walls (2 x 3 meters square) purchased from many areas in West Java at the price of only Rp. 27,000 per sheet.

Thru the co-op, all of these bamboo walls were disseminated to 180 families that met the Bamboo Walls Initiative criteria, and/or widows, families with toddlers, the elderly, the poor, and orphans.
The Gravity-Fed Piped Water System
Before the earthquake, the main sources of water in the community were a deep well or spring water fetched using a pail or directed through bamboo or (0.5 cm diameter) plastic tubing. After the earthquake, most of the wells were drained and ruined, leaving the surrounding springs as the main source of water.

Our survey and village mapping activities revealed that there were enough springs surrounding the Mblali Sub-Village, Seloharjo to provide the water needed by the whole neighborhood/settlement cluster, and that they were at an appropriate height to be directed downward through pipes using a gravity-fed system.

The Gravity-Fed Piped Water System project initially started on 23 August 2006. Working together with the community, we built a 1,262-meter gravity-fed piped water system for the people of dusun Blali (sub-village), which provided water for 989 people/356 families (houses). All the materials, technical designs, and technical assistance were provided by Gaia through individual donors, while the labor was provided by the community. This project was valued at an amount of Rp. 36 million.

Starting in February 2007, the GAP Foundation (a corporate social responsibility initiative of GAP Inc. USA) committed to support the continuation of this project, giving more people access to this water for their daily needs. By June 2007, all 2,465 meters of piping had been installed and were operating to the benefit of the community in 5 RTs in Mblali Sub-Village, Seloharjo, Pundong, Bantul.

Development Stage: Community Settlement Reconstruction Assistance – Gaia as an Implementing Partner for International NGOs

- The OXFAM Innovative Transitional Shelter (ITS) Project
  Through the ITS grant from OXFAM, Yayasan Gaia built 369 transitional shelters for 369 families in Seloharjo, spread across seven Seloharjo sub-villages, in 30 days between 5 September and 5 October 2006.
  The allocated budget per house was 990,000 rupiahs. The rest of the funds were contributed by the community themselves, including the materials contributed for the Chainsaw and Bamboo Walls Initiatives. During actual implementation, the 990,000 rupiahs per house was averaged across houses, with some costing more or less than that allocated amount, depending on the individual contributions of households and/or the availability of building materials.

- The IOM Temporary Shelter (T-Shelter) Project
  After the community of Seloharjo received assistance-in-kind in the form of 369 innovative temporary shelters (ITS) from Oxfam-GB, Yayasan Gaia then moved them into another area that had not yet received any shelter assistance. Supported through the T-Shelter grant from IOM, Yayasan Gaia planned to develop 600 transitional shelters for 301 families in two villages, Sendangtirto and Kalitirto, in Berbah Sub-District, Sleman, Yogyakarta. The project started on 2 January 2007 and was finished by 27 February 2007.

Reviews And Evaluation
Gaia corps’ experiences in dealing with these Emergency Response Initiatives was primarily related to two interrelated activities: fundraising (in terms of cash and other materials), and assistance delivery. These two activities were conducted under a management system that involved several working groups to completely serve the needs of the disaster victims and fulfill the requests of the donors.

Gaia corps Coordination Office (Headquarters)
Personnel were responsible for:
1. Collecting as much assistance as could be obtained, including information on “potential donors,” contacting potential donors to propose assistance programs, receiving and sorting donations, and managing all of the donations collected;
2. Managing funds and any other types of assistance based on the real needs of victims and their communities, using information provided by the field assessment staff in terms of the availability and time priority of needs, including managing the purchasing system and warehouse system (i.e., identifying which supplies should be delivered first, which should be stored in the field-site warehouse, which should be kept in the HQ warehouse, and which should be delivered to other needy areas instead of the GaiaCorps main area);

3. Managing volunteers: During the Emergency Response Stage, GaiaCorps had as many as 340 volunteers. It should be noted that the volunteers came from various backgrounds, had various competencies, and also had differences in terms of their time availability. These had to be managed to meet the real needs of volunteers in the field.

4. Managing relationships with donors: During the Emergency Response Stage, GaiaCorps received donations (cash and in-kind) and human resources from hundreds of donors, including individual donors, community organizations (PERWAKIN – Persatuan Warga Kristen Indonesia – New York, Orde de Saints Fortunard Germany, Perkumpulan Warga Bintaro Jakarta, Perkumpulan Petani Sayur Bambanglipuro, Bantul, Students of Medical Faculty Gadjah Mada University, etc.), private companies (PT United Tractors Tbk., PT. Actavis, PT Dexamedica, PT Rekayasa Industri, RS. Duren Sawit Jakarta, Female Radio Yogyakarta, etc.), local NGOs (Yayasan Dian Desa Yogyakarta, Perhimpunan Pemberantasan Tuberculosis Indonesia, Yayasan Umar Kayam, Yayasan Komunitas Yogyakarta, TK Al Husna Madiun, Susteran Magelang, WALUBI – Perwakilan Umat Buddha Indonesia, Bali Crisis Center, etc.), government agencies (PDAM Bantul, PLN Bali), and international NGOs (Oxfam GB, CUSO Canada, UNICEF, Caritas France, and CRS).

Given that GaiaCorps activities could not have been performed without this support, GaiaCorps should manage good relationships with these organizations by:

1. Updating information about the camp site conditions, the delivery of aid, and daily activities through blogs managed by GaiaCorps volunteers and Gaia Foundation personnel. Through the blogs, donors were able to see the activities being conducted using their donations, how the donations had been channeled, and who was benefitting from their donations. One blog was written in Bahasa Indonesia (http://gaiacorps.blogspot.com) and two blogs were written in English:
   - http://gaiacorps-e.blogspot.com
   - http://corps.gaiasol.com/updates/index-e.html

2. Inviting the donors to several events conducted by the Gaia Foundation as an expression of gratitude for the trust placed in the foundation in channeling donations to beneficiaries.

3. Maintaining good relationships by keeping in contact with donors and informing them about every Emergency Responses Initiatives (ERI) launched by the Gaia Foundation after the earthquake (e.g., ERI for tsunami victims in Pangandaran, West Java, and flood victims in Ngawi, Bojonegoro and Lamongan, East Java).

Camp Divisions

The personnel working at the camp site were led by a Camp Manager and were divided into several divisions:

1. Health Center: This was the main facility, which started as a GaiaCorps Mobile Clinic Unit that then developed into a fixed-location clinic. The clinic began providing free medical treatment for the victims on the first day of the disaster. The clinic was supported by 15 doctors, 15 medical students, and 17 paramedics working in shifts, all of whom were assigned to posts at Mblali Camp.

2. Mobile Clinic: After the "original mobile clinic" developed into the health center at the Mblali Camp, GaiaCorps initiated a new mobile health center unit to provide free medical services to the remote areas of Bantul. Mobile clinic services were offered to patients who needed regular visits by physicians, but whose houses too far away and remote to allow them to visit the health center regularly. Some other "house call" visits were also made. GaiaCorps also received some requests for services from other organizations that had found victims in their coverage area who did not have access to medical treatment.
3. Cyclist Squad: Also related to health clinic, the cyclist squad consisted of at least 10 cyclists who were responsible for delivering medicines to victims located in remote areas who would otherwise not be able to go to the clinic just to get the medicines they needed.

4. Logistics Center: This was one of the most important parts of the system of aid distribution. The logistics center was responsible for managing all the supplies and distributing them to the victims. All distribution activities had to be managed based on the supplies available in the warehouse, the number of people to be served, and the types of aid to be delivered (based on the number and time priority of needs). All the baseline data for distribution were provided by an Assessment Team.

5. Assessment Team: The Assessment Team was responsible for gathering an array of real-time data and information regarding the condition of the coverage area and the needs of victims. Several community meetings were conducted by this team (inviting community leaders) to verify the data they found on the community’s actual conditions.

6. Education Team: The Education Team served as ‘temporary teachers’ or tutors for the children residing in the coverage area. They were equipped with toys, books, and basic knowledge of children’s lessons, and were responsible for managing children’s activities on a daily basis.

7. Camp Infrastructure: Since the camp site was serving as a temporary settlement for victims, we had to make sure that the settlement was healthy for people to live in. The infrastructure team was responsible for constructing the tents at the camp site, as well as building the sanitation system (i.e., the communal toilets and sewerage system) and electricity system for each of the tents.

8. Communal Kitchen: The communal kitchen was used to prepare ‘ready to consume’ foods both for victims and all volunteers.

9. Stress Release Team: The Stress Release Initiative consisted of three main activities: friendly visits, “From Dusun to Dusun,” and “From Mosque to Mosque.” This team was responsible for carrying out a series of activities related to this initiative.

10. Transportation: This division played a significant role in supporting all Gaiacorps activities. The ‘transporters’ were responsible for transporting volunteers from the Gaiacorps HQ to the camp site, as well as for carrying supplies from one place to another (i.e., from donors’ warehouses to the Gaia HQ warehouse, from the HQ warehouse to the camp site, and from the camp site to several remote locations).

The whole system above had to be executed in a coordinated and integrated manner to achieve effective and efficient results. Through the implementation of this coordinated strategy, the initial activity of GaiaCorps – the Mobile Clinic – was able to have a much larger reach that met the needs of the beneficiaries and addressed the desires of all donors involved.

It should be noted too, that none of these activities would have been successful without the participation of the affected community members. Without their involvement, we would not have been able to identify their real needs, and thus would not have been able to deliver the appropriate aid.

Lessons Learned

As described in point IV above, the Emergency Response Initiative strategy could be defined as two interrelated activities:

Fundraising (cash and in-kind donations)

This activity requires several skills, such as the ability to utilize the organizational network (including the personal networks of the individuals involved in fundraising), and the ability to manage relationships with various types of partners/donors. Those competences are prerequisites for obtaining a much wider spectrum of donors (thus generating a greater amount and variety of assistance), as well as for ensuring that donors feel good about the assistance they provide.

Delivery assistance

This activity also requires several skills, including the ability to identify the real needs of the community (the disaster victims), the ability to manage the logistics system, and the ability to match assistance received with actual needs (to match demand and supply). All of those skills had to be deployed effectively to ensure that the assistance provided by various types of partners/donors would be channeled in a responsible manner.
Figure 3.70 (from top to bottom, left to right) Figures a and b The Main Tent Kampong of GaiaCorps Refugee Camp at the Blali Soccerfield, Seloharjo, Pundong, Bantul. Figures c and d The volunteers (physicians and paramedics) perform minor surgeries on seriously wounded earthquake victims. Figure e special tent is arranged for children’s activities, including playing, drawing, singing, and reading. Most of the drawings mounted on the tent walls are expressions of the children’s traumatic experiences during the earthquake. Figure f Carlos Beer, a volunteer from Venezuela, carries a sack of rice. Figures g and h The earthquake victims line up to get their daily supplies.
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**Activities**

- Temporary Shelter Development
- Food & Non Food Supplies Distribution
- Regular Community Meeting
- Mapping, Quick Assessment, Cooperative Establishment
- The Chainsaw Initiatives
- The Bamboo Wall Initiatives
- The Gravity Fed Piped Water System Initiatives

**Duration**

- 1 Month
- 2 Weeks
- 1 Month
- 2 Months
- 2 Months
- 4 Months

**Source of Fund/Assistances**

- Gaia Foundation’s Free Fund
- Individual donors
- CUSO Canada
- International NGO: OXFAM GB, IOM, GAP Foundation

**Type of Funding/Assistance**

- In Cash
- In Kind/Natura

- Gaia contacted the donors before the project began with a brief information about the project rationales and the advantages for the beneficiaries; and ask their permission to use the fund to finance the project.

- After the project completion, Gaia submitted a report to the donors involved.
3.4. Social Affairs: Gotong-Royong as Local Wisdom

M. Baiquni

Introduction

Today, the daily lives of the earthquake victims have returned to normal. Some are even living in better conditions than before due to their improved capacity to solve problems and to cope with challenges. During the last three years, effective efforts have been made in the areas of housing reconstruction and repairs to the public infrastructure. Despite this success, livelihood recovery has been slow due to the damage and losses suffered by businesses in the production sector. This paper examines two case studies (addressing housing and livelihood recovery) to better understand the social networks and solidarity principles that have stimulated these efforts.

According to the Indonesian government, recovery efforts have been relatively swift. As of December 2007, approximately 279,000 houses had been rebuilt and 97.3% of the people had been resettled. The two provinces have taken different approaches to permanent housing recovery: Central Java distributed its shelter grant evenly among the affected households, while Yogyakarta provided a government grant to community groups that prioritized the distribution of funding among members of the community. By March 2008, beneficiaries in Yogyakarta and Central Java had each received on average Rp. 25 million, approximately US $25,000 (JRF, 2008).

The Preliminary Damage and Loss Assessment estimated damage in the production sectors to be valued US $1 billion, affecting 650,000 workers. It also concluded that 30,000 enterprises, mainly micro and small and medium-size businesses, were directly affected. It is estimated that approximately 116,000 livelihoods were affected. Unlike housing reconstruction, livelihood recovery takes longer to achieve. The UNDP indicates that 95% of the affected entrepreneurs have resumed their business activities, but a business survey conducted in April 2007 indicates that only 47% have reached their pre-earthquake capacities.

Research Questions and Methods

Several questions have emerged out of this earthquake recovery process. For example, Why was the disaster recovery process in Yogyakarta proceed relatively quickly? What kinds of social conditions, i.e., solidarity principles, supported recovery efforts, and in what way did the social network work effectively?

The methods applied in this study are: (1) micro-level study using observation and in-depth in-person interviews in the hamlet of Kembang; and (2) macro-level study using secondary data from government, NGOs, and university reports on the disaster in Yogyakarta and Central Java.

Gotongroyong as Local Wisdom

Gotongroyong is rooted in rural Javanese culture, and refers to the principle of mutual help among neighbors in a community. Gotongroyong is imbued with such values as respect and responsible redistribution (3Rs), solidarity, sharing, and strengthening (3Ss) and also teposeliro (tolerance), as reflected in the motto Bhinika Tunggal Ika (“unity in diversity”).

Gotongroyong is basically a voluntary process of sharing ideas, organizing people, collecting materials, contributing finances, and mobilizing manpower in order to implement social and cultural activities. Gotongroyong is often applied at two levels i.e., household and community activities. Many household level activities, such as housing reconstruction and family ceremonies (giving birth, weddings, and funerals) require the help of neighbors. Gotongroyong can also be implemented at the community level in such efforts as the rehabilitation of the public infrastructure (roads, irrigation systems, public facilities; Bintarto, 1983).
Since capitalist modes of production and the modernization of development were introduced, Gotongroyong has been declining, and seems to have become neglected as a mode of development. Especially during the top-down approach to development adopted in the 1970s to 1990s, many government projects and business activities were based on different principles and practices that were not compatible with the promotion of the local wisdom of Gotongroyong.

Recent disasters in 2006 in Yogyakarta and Central Java, that is, the volcanic eruption of Mount Merapi and the May earthquake, shocked the government and people. These reminded us that Gotongroyong as local wisdom can be applied in efforts to recover from problems related to evacuation and emergency, rehabilitation, and reconstruction. These efforts require the principles of solidarity and mutual help that actually already exist in the traditional social system. This paper exposes two practical case studies that offer lessons about Gotongroyong.

Case 1. Social Solidarity in Housing Reconstruction

The reconstruction of housing and settlements in a way that meets seismic-resistance standards is one of three pillars of the post-earthquake recovery policy formulated in the directives of the President of the Republic of Indonesia dated June 2006. The Preliminary Damage and Loss Assessment conducted weeks after the earthquake estimated that a total of 358,693 houses had been damaged or destroyed. Subsequently, the provincial governments confirmed that more than 280,000 of these houses were uninhabitable. Of these, 177,469 were located in Yogyakarta and 104,084 were in Central Java (JRF, 2008).

The population density in Yogyakarta Province is around 1,018.04 per km2 with a growth rate of less than 1%, while in Central Java, these figures are 959 per km2 and 0.9%. Most of the households consist of parents and two children. Sometimes, grandparents may live in the same house. Male-headed households are dominant, with female-headed households limited to cases of either divorce or the death of the husband (FAO, 2007). In some cases, extended families can be found to be living in traditional rural Javanese households. Such households consist of extended family members that live in one house and share a kitchen. When the homes of such households were destroyed, these households tended to rebuild separate houses for each family.

Housing reconstruction was not conducted by contractors and houses were not totally built from new materials as was the case in Aceh (after the tsunami) and Ambon (after the social conflict). In Yogyakarta, most houses were rebuilt by their owners using a combination of new materials and earthquake debris, such as bricks, wooden windows and doors, wood structures, and roofing materials. Some of these materials were strong and fit enough to be used for housing reconstruction. During the recovery process, the demand for bamboo greatly increased in DIY and Central Java, forcing residents to procure bamboo from other districts.

A community-based approach to housing reconstruction has proven to be effective in the reconstruction process. The community-involved planning process has made it possible to effectively target beneficiaries and distribute resources to the most vulnerable members of communities. It was the application of Gotongroyong in the mobilization of resources that enabled the speedy delivery of housing reconstruction. Satisfaction levels are high as communities take ownership of the process and make consensual decisions regarding their needs.

In Kembang Hamlet for example, the community organized themselves to access support from outside, and redistributed that support to its members. Housing reconstruction was also implemented from a spirit of Gotongroyong, as people helped the poorest families in their communities, and the families that suffered the most in the disaster.

During the process of assessing the damaged houses, some of the owners wanted to be prioritized to get access to government support. Competition and social friction emerged during the chaos of the early days. But then they held meetings and engaged in a process of consensus building known as Musyawarah Mufakat. In this process, the leader shared information with the community and then
opened meeting up to critical debate and discussion to facilitate the achievement of a consensus among community members.

**Case 2: Social Network in Livelihood Recovery**

An assessment of livelihood recovery estimated the damage in the production sectors to be valued a US $1 billion, affecting 650,000 workers. It also concluded that 30,000 enterprises, mainly micro and medium-sized businesses, were directly affected. It is estimated that approximately 116,000 livelihoods were affected.

The recovery of the regional and community economies has been slower than anticipated. A survey conducted by the UNDP in April 2007 indicates that 95% of the affected entrepreneurs have resumed their business activities, but that only 47% have reached their pre-earthquake capacities. The mid-term evaluation conducted by Bappenas concluded that the funding gap in the production sector recovery amounted to Rp. 1.0 trillion (US $106 million) and that the estimated total funding required in this sector was Rp. 1.3 trillion (US $138 million). Two livelihood support projects have been developed and will commence soon. These projects will focus on the rehabilitation of micro, small, and medium-sized enterprises affected by the earthquake.

A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, and provide net benefits to other livelihoods locally and more widely, both now and in the future, while not undermining the natural resource base (FAO). The Sustainable Livelihood approach works in a holistic and integrated way to build on, strengthen or increase access to community-based assets such as human resources (skills and knowledge), physical assets (tools, equipment, infrastructure such as roads, schools and health centers), social capital (formal and informal networks), financial assets (credit) and natural resources (fish, cattle, paddy fields).

This is why livelihood recovery takes longer than housing reconstruction and public infrastructure repairs. At the macro level, the government has worked on a policy to facilitate credit via banks, market rehabilitation, and the provision of exhibitions and trainings. The business community also takes part in supporting micro and small entrepreneurs via CSR programs and facilitating market access. NGO also worked to assist households in recovering capital so they could continue their livelihoods. Related to micro-macro linkages, the rehabilitation strategy calls for supportive government policies to facilitate the best response to the needs of different community groups, especially those of the most vulnerable groups.

Gotongroyong in livelihood recovery seems to be found in certain market linkage of commodity. For example, the handicraft industries in the Bantul District get support from buyers from Bali. They can provide support to producers who lost their productive assets in such forms as soft loans, raw materials, and equipment.

**Leadership, Motivation, and the Media**

We noted that Gotongroyong is one of the approaches and practices used to achieve a successful recovery. Gotongroyong as a social movement requires leaders who have the power to organize and motivate communities to help one another in the post-disaster recovery process. Strong leadership, enlightened motivation, and the widespread use of the media are very important for steering the movement and empowering communities to wake up and work from the ruins.

“Yogya Bangkit!” is not only a slogan, but also a reference to the spirit to develop from within. Some communities and their leaders agreed to refuse all types of foreign debt to achieve the reconstruction of their homes and the public infrastructure. The reason is that it might contribute a disaster to Indonesian economy.

The social solidarity to work toward Yogya Bangkit comes from individuals and organizations during recovery. Many of these are activists and professionals who have been educated in this University City.
When Yogyakarta has suffered its disasters, many of these people who had been working all across Indonesia, were eager to help and to support humanitarian programs. They felt a debt of honor from the time they were students in the local schools, academies, institutes, and universities, and even a debt of honor to the community of Yogyakarta as a whole.

Many trainers support the work of community volunteers. Hundreds of trainings were attended by thousands of individuals who formed a huge source of social capital and had the energy to implement many programs.

**Lessons Learned**

1. Gotongroyong, as local wisdom in recovery program, created momentum in revitalization process. This local wisdom can be restored as an approach to community development especially in post-disaster recovery.
2. Strengthening existing local institutions and community groups plays a key role in recovery. Musyawarah Mufakat among the community groups is very important in creating mutual understanding and developing a consensus for the application of Gotongroyong.
3. Rebuilt houses should comply with seismic standards. Achieving this requires technical assistance and proper control over implementation. Social preparations need to be made to ensure that designs are introduced that contribute to the quality of construction.
4. Livelihood recovery should expand social networks to promote solidarity and partnerships and to ensure that assets and capital are restored and functioning properly.
5. Recovery efforts in Yogyakarta have produced fast and effective results. We believe that the local principles of Gotongroyong and Musyawarah Mufakat have contributed to this achievement.

Satisfaction with the recovery program in Yogyakarta has been expressed by many donor agencies, as reflected statements in their reports such as the following: “The community-based development approach has certainly been the right choice to build ownership and motivation for the reconstruction efforts among community members. It is very meaningful to see beneficiaries now living in their homes and returning to normal life and work.”

**CASE 3.4.1. Development of the Batik Home Industry for Community Welfare Improvement**

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**Introduction**

This project was conducted in Girilaya Village, Wukirsari Sub-District, Imogiri District, Bantul Regency, Yogyakarta Province. The village is located 17 km south of the city center of Yogyakarta. Girilaya Village covers a wide area, and is currently divided into three hamlets: Girilaya, Cengkehan, and Karangkulon. Girilaya is a poor village in a hilly dry land.

Many people in Girilaya do not have their own farms or businesses. As a batik village that produces hand-made batik, there are 195 households in Girilaya, where all the women are skilled batik artists who have inherited the skill from their ancestors. They are hired by land owners or batik traders who give them materials for making batik: patterned cotton sheets and wax. When the May 2006 earthquake destroyed some of the houses in this village, it also destroyed the tools and equipment used in making batik. Since the women had a very important role as income producers for their families as a result of their batik-making skills, the earthquake destroyed both their work and their economic status. They were struggling for their lives and really needed help in restoring their livelihoods.
Description of the Project

Background and Objectives of the Project

The 2006 earthquake in Yogyakarta Province has brought many changes to Girilaya Village. The damage inflicted by the earthquake on local houses and batik-making tools and equipment left the women batik crafters without jobs. Their families were left in financial disarray, since the women were important income earners for their households. Batik-making is the only skill practiced by women in Girilaya, and batik-making has long been a tradition in the community. This batik-making tradition is an invaluable cultural asset.

Of the 195 families in the village, there were more than 100 batik workers (all women, 25 to 65 years old) with excellent batik-making skills but no working capital for buying materials. The women batik workers in Girilaya worked in their homes for batik traders (pengepul or juragan). They received raw materials, consisting of cotton sheets with certain batik patterns, wax, and batik tools from the traders. Usually they were able to finish waxing a sheet in four to seven days. They were paid 30,000-50,000 rupiahs (US $3.30-$5.00) per sheet or 7,000 rupiahs (US $1.30) per day. If they worked every day, they would earn US $20.20 per month. This was a considerable sum of money, accounting for 50% of the family income, even though it was very small amount compared with the minimum wage in Yogyakarta of US $55 per month. This is indicative of the very low level of economic prosperity in Girilaya.

This project aimed to improve the community's socioeconomic conditions. It basically focused on the batik business as a home industry since this business had long existed in Girilaya Village. The project intended to develop community independence in order to improve family welfare, especially through women's activities. As mentioned above, women played a very important role in improving their family's welfare. The improvement of women's income would really help improve their family income. As a family's income rises, they are likely to have better health and safety. Poverty will be gradually reduced, so that the economic condition of the community in general will be improved by the development of formal community groups or batik business cooperatives. Achieving community independence would mean that the community had become able to handle the batik business independently (from batik production to marketing) within its own groups or cooperatives, and would no longer depend on the batik traders as before. Such independence will allow the community to have their own choices regarding their lives and their futures. In the long term, it will strengthen the social-economy of the community.

The project had three objectives: (1) improve batik-making capabilities and product knowledge of batik, including design patterns and products, (2) improve the community's ability to manage the batik business, and (3) sustain the batik business. During the project, there were trainings and workshops on batik business management, including the development of four small batik business groups. These groups learned about cooperative management and practiced managing their organization using a cooperative system. They were guided in the development of business plans (i.e. planning of activities and budgets that would be proposed to get revolving fund). They learned to develop the mechanisms involved in managing a revolving fund. If all the batik crafters in Girilaya had been involved in this project, about 150 people would have been indirect beneficiaries. With this project, it was expected that as many as 400 would have been impacted.

Activities

To maximize the impact on the community, the project focused on three activities:

- Trainings (lectures and site visits) and workshops (exercises and practice) in both batik-making and management: 3.5 months
- Practice: 2.5 months (developing small groups, creating a business plan, developing proposals for a revolving fund, running the business). After completion of the project, JHS continued working with the community in implementing and monitoring the revolving fund for at least 6 months.
**Period of Implementation**

This program was conducted over six months, from the beginning of August 2007 until the end of January 2008. The phases of the program were as follows:

<table>
<thead>
<tr>
<th>Table 3.26 Phases of the Program</th>
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<tbody>
<tr>
<td><strong>Activities</strong></td>
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<tr>
<td>Training and Workshops</td>
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<td>Practice</td>
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**Target / Expected Outcome/Output**

This project targeted women in order to help them improve their family welfare. The expected outcome of this project is that Girilaya Village will be a ‘batik tulis village’ where small batik business group organizations are able to handle the entire batik production process and business. In order to be an independent batik village, the local community, particularly women batik crafters, need the:

- ability to master the overall batik production process
- ability to manage the batik business, including marketing, by building small groups of home batik makers
- knowledge and skills in batik design and the ability to make produce creative batik products
- Knowledge and skills in the development of natural dyeing.

This project could potentially result in the following achievements:

- Improvements in the ability to manage the overall batik production process
- Improvements in the ability to manage the batik business
- Sustainability of the batik business

**Lead Agency**

The lead organization in the program was Jogja Heritage Society (JHS), a volunteer-based, non-governmental organization. Financial resources come from activities for the community provided by funding institutions (local/international and governmental/non-governmental bodies).

In this case, the donor institution was the Australia Indonesia Partnership (AIP), which funded the project under its Australian Program Livelihood Project.

**Quantitative Information**

The total budget for all activities in this project was Rp. 644,250,000. The targets of this project were 125 women batik workers with excellent batik-making skills but did no working capital for buying materials.

- The project was conducted by a staff of nine:
  - 1 project coordinator
  - 5 experts
• 1 administrative staff
• 2 field surveyors

Reviews and Evaluation

The first step in this project was to develop four small batik business groups (associations), each with about 30 members. These groups learned about cooperative management and practiced managing their organization using a cooperative system – especially “tanggung renteng” cooperation. They received guidance in the development of their business plans. They learned to develop the mechanisms for managing the revolving fund. Before the project was implemented, there were two batik crafter associations, and during the project, two more batik crafter associations were established. Almost all batik crafters in Giriloyo are now members of these associations.

In conducting the training and workshops, Jogja Heritage Society (JHS) collaborated with Pusat Penelitian Batik (Batik Research Center) Yogyakarta and INSPECT (an NGO with economic activities) on the training related to batik business management. The activities and participants of the training and workshop were as follows:

Table 3.27 Activities and Participants

<table>
<thead>
<tr>
<th>OUTPUT</th>
<th>ACTIVITIES</th>
<th>PARTICIPANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BATIK PRODUCTION PROCESS AND THE PROVISION OF EQUIPMENT</td>
<td>Improvement of ability to handle batik production process</td>
<td>a. Product knowledge: batik pattern design and product design</td>
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<tr>
<td></td>
<td></td>
<td>b. Training in batik techniques: pattern drawing and waxing</td>
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<td></td>
<td>c. Training in coloring and dyeing</td>
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<tr>
<td>2. BATIK BUSINESS MANAGEMENT FOR SMALL BUSINESS GROUPS</td>
<td>Improvement of batik business management capabilities</td>
<td>a. Training in business organization, entrepreneurship, and financial management</td>
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<td></td>
<td></td>
<td>b. Training in production management: R&amp;D, production process, inventory (storing, packaging, labelling, delivery)</td>
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<tr>
<td></td>
<td></td>
<td>c. Training in sales management: promotion and marketing</td>
</tr>
<tr>
<td>3. SUSTAINABILITY OF THE BATIK BUSINESS</td>
<td>Planning and implementing a revolving fund for small business groups</td>
<td>4 groups</td>
</tr>
</tbody>
</table>

*) All batik crafters (both adults and teenagers), the main beneficiaries.

**) Batik crafters and others (non-crafters).

Progress and outcome of the program

After the project ended, JHS continued to monitor the village for six months. The clear benefits of the program to the women batik crafters of Girilaya were, as individuals, improved skills and knowledge in batik techniques (pattern drawing, waxing, coloring, and dyeing), and as a batik group, improved skills and the ability to participate in the overall batik-making process, from batik pattern drawing to batik dyeing. Equipped with new knowledge and skills related to batik techniques and production, these batik-makers now have the ability to develop new batik designs and to make production innovations. Before the program, jarik (a piece of traditional batik cloth – 100 x 200 cm) was the only product of Girilaya batik. After the program, a greater variety of products were developed, such as batik clothes, tablecloths, wall hangings, bags, and wood batik products.
The batik crafter groups have been able to manage the batik business (financial management, promotion, and marketing). Group members are no longer batik workers who depend for the juragan, or traders, but have developed a sense of independence within their groups because of their participation in the batik production process. The project promoted the independence of the community by empowering people to handle all aspects of the batik business within its own groups and cooperatives, from design to marketing, and thus freeing them from their previous dependence on the batik traders. This independence will enable the community to make their own choices regarding their lives and their future. In the long term, it will strengthen the socioeconomic status of the community.

Today, Girilaya batik is becoming well known, especially in Yogyakarta. The four batik groups routinely supply several batik shops in Yogyakarta: Mirota Batik and Juwita Batik in Malioboro Street, and Ulen Sentalu Museum and Restaurant in the Kaliurang area. Girilaya batik is also often displayed at craft exhibits, such as the Yogyakarta Art Festival, Yogyakarta Local Craft Products, and the Indonesian Craft Festival in Jakarta. Moreover, efforts to promote Girilaya batik and heritage tourism, particularly by JHS, has prompted many visitors, individuals and groups, to come directly to Girilaya Village to buy batik and to follow the heritage trail. Step by step, Girilaya hand-crafted batik is making a reputation for itself, and this is keeping the local batik business running.

Obstacles and Challenges

Several problems have arisen over the course of this project:

- **Problems related to community organization**
  There were conflicts of interest among the group members due to a lack of understanding of the importance of the organization, the structures of the organization, and the benefits of the organization to members. This problem led to a lack of awareness by each member of their responsibility to the organization.

- **Problems related to the production process**
  The continuity of the raw material supply, especially for natural dyeing that is environmentally friendly, has been a problem since the quantities of natural raw materials, such as indigo leaves and mahoni bark, are limited. Another problem was the low level of awareness among the people of the importance of investing in batik tools and equipment.

- **Problems related to marketing**
  After the project, several problems in marketing the batik emerged, such as a lack of awareness regarding the importance of maintaining consistency in production, the maintenance of certain standards of quality, price, and timeline, and ensuring long-term market access.

Challenges

- **Members of the batik groups should be continuously reminded of the importance of the individual’s role in benefiting the group.** The organizational structures and rules should be clearly stated and well understood by each member of the organization.
- **Find more suppliers of raw materials (cotton, wax, etc.) and do not depend on a single supplier.**
- **Develop natural dyeing techniques that are environmentally friendly by growing natural dyeing plants in many places in the village.**
- **Find other possible markets and outlets, and improve the quality control system at each step of the production.**
- **Develop batik products using many kinds of media (stone, wood, ceramics, etc.) for many different purposes (fashion, interiors, etc.).**
- **Develop Girilaya as a batik village that will enhance village prosperity.**
- **Implement this program among other batik workers in other villages.**
Lessons Learned

- In the post-disaster phase, physical reconstruction is easier to achieve than social and economic reconstruction. This program has led to the restoration of a community’s livelihood and has enhanced their quality of life by improving the women's ability to manage their batik businesses independently. This type of program is much needed in communities following a disaster.
- Working with communities requires special efforts. Publicity of the program among community members should be done well before its implementation. The community should be involved from the beginning in program planning, program implementation, and program evaluation. The social relationships, the most important factor in conducting this program, between the lead agency (JHS) and the community were successfully formed because of these key efforts by JHS:
  o Promotion of intensive communication with key persons in the village before and during program implementation.
  o JHS had two project assistants stay in the village and live among the community.
  o Besides acting as program coordinator, JHS also acted as a mediator when there were social conflicts in the community.

Annotations

Researchers: Titi Handayani, March; Dwita Hadi Rahmi, MA; Dharma Gupta
Organization: Jogja Heritage Society (JHS)
Date of Compilation: March 2008

CASE 3.4.2. The Role of the Shelter Cluster in Disaster Risk Reduction Programs in Java

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Introduction

Indonesia is located along the so-called “Ring of Fire,” a narrow belt of intense earthquake and volcanic activity around the Pacific Basin (Gates and Ritchie, 2007). Communities in this area should be aware of the natural disaster risks and should be prepared when such disasters occur. However, the level of destruction sustained in the housing sector as a result of the 2006 Yogyakarta and Central Java Earthquake revealed that the communities had neglected these threats.

Field observations after the earthquake reveal that most if not all of the housing damage was caused by poor quality construction and inadequate technical knowledge regarding earthquake resistant-construction. Many of the houses failed to meet existing building standards and were built only to
withstand a vertical static load. Therefore, these seemingly well built houses were actually quite fragile, and collapsed easily when the earthquake struck.

The magnitude of the damage and losses caused by the 2006 Java Earthquake has raised concerns about the vulnerability of the people in these areas to natural disasters. The logical question is: Why do communities ignore the potential earthquake hazard, in spite of the fact that Java and most of Indonesia are located in an earthquake-prone region? That is, people in Java tend to ignore the threat of an earthquake disaster despite the fact that they are living in an earthquake-prone area. This is in a sharp contrast with the community living near Mount Merapi, which appeared to have been well prepared for the possible eruption of one of the most active volcanoes in the world.9

**Disaster Awareness**

Historically, Yogyakarta has been known as a volcanic-eruption-prone city, while it had not been recognized as an earthquake-prone city until May 2006. The frequent eruptions of Mount Merapi are well documented (Alexander 1993; Gates and Ritchie 2007) and have almost become a part of the everyday life of the community living in the “danger zone” near the volcano summit. This has led to much better eruption preparations by the government, communities, and humanitarian organizations aimed at minimizing the adverse effects. Effective precautionary measures are in place to ensure a timely, appropriate, and efficient organization and delivery of response and relief activities. On the other hand, it would have been very hard to convince communities in Yogyakarta prior the May 2006 earthquake to build more expensive earthquake-resistant houses when no real earthquake threats had been experienced up to that point. This is because longer intervals between disaster occurrences tend to reduce people’s awareness of the potential risks (Wisner et al. 2004; Coppola 2007). This highlights the crucial role of the temporal characteristics of earthquakes and other natural disasters in effectively implementing participatory disaster risk reduction programs.

The massive devastation caused by the May 2006 earthquake to people’s property and its adverse effects on their lives and livelihoods has resuscitated communities’ awareness of the earthquake danger in their areas, and to the importance of having earthquake-resistant houses. Unfortunately, this golden opportunity to reduce the communities’ future vulnerability was not taken advantage of by humanitarian organizations (i.e., the shelter cluster leader) in Java.

**The Role of the Shelter Cluster**

The cluster approach was used by the humanitarian community for the first time in Indonesia in order to achieve better response coordination among agencies following the disaster. The cluster approach was first introduced during Pakistan’s 2005 earthquake disaster. Clusters were established in nine activity areas, reflecting both traditional relief services, such as water and sanitation, food and nutrition, health, emergency shelter, and education, as well as newer services provision for emergency telecommunications and logistics (United Nations Coordination Centre for Yogyakarta and Central Java, 2007) and lead agencies were assigned to each cluster. In the case of the Java Earthquake, the Shelter Cluster Leader played a central role in the relief efforts since most of the damage sustained was in the housing sector (BAPPENAS, 2006).

Despite the critical role of disaster risk reduction programs in reducing a community’s vulnerability, the Shelter Cluster Leader did not put the necessary efforts into this priority. As presented in Figure 3.74, the amount of funding from international donors allocated to disaster risk reduction programs was around USD 17 million, or less than 10% of the total funding. The public outreach programs, which were found to be highly effective for educating the community (Kodrat and Suryabtara, 2007), received only 1.1% of the total aid.

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9 Three months prior to the earthquake, volcanic activity had increased considerably, alerting the communities living in the danger zones to be ready for evacuation at anytime. The central government and international communities were monitoring the situation closely and were ready to take action when necessary.
Compared to the USD 600 million in government funding provided for the housing reconstruction program, the budget for disaster risk reduction programs was comparatively small, considering the risk of having technically improper housing construction. Within two years, the actual expenditures on housing reconstruction could easily be more than triple the amount provided by the government, as the affected communities are building bigger houses than suggested by the government. This is partly because the average floor area constructed by the community is much smaller than their previous houses (Suryabrata, 2008).

When the reconstruction work is not performed in accordance with the technical requirements, these enormous investments may be wasted, as they could be wiped out in the event of a future earthquake of a similar or greater magnitude. The wasted use of reconstruction resources, on a much smaller scale, has already occurred in Padang, West Sumatra. In that region, houses rebuilt after the 2004 earthquake were again destroyed in the 2006 earthquake. Insufficient technical supervision, guidelines, and funding were blamed for the mistakes.

However, the major drawbacks to the implementation of disaster risk reduction programs in Java were not only the amount of funding made available to the Shelter Cluster Leader, but also the program timing. Programs were implemented between the end of September 2006 and January 2007 when many of the communities had already started the reconstruction of permanent housing (see Table 3.28). Findings from a survey on the effectiveness of the public outreach program show that although seismic construction training was urgently needed (96%), the majority of the communities (83%) expressed concerns about the late implementation of the program (Kodrat and Suryabtara. 2007). When the training was being conducted (October 2006 to February 2007, 5 to 8 months after the earthquake), 91% of households ($n = 1,759$) had already started building their permanent houses. This was another missed opportunity for the Shelter Cluster Leader to make a significant contribution in the reconstruction and recovery process in Java.
Reconstruction Quality

The community-based reconstruction process had been advancing extremely well, owing to the strength of Javanese culture, which promotes less dependent on external aid. The relatively small amount of funding provided by the government was more of a stimulant for the community to bring in their own resources for the reconstruction of permanent houses. The high tolerance of the communities helped smooth the entire process of the reconstruction program, from data collection to the disbursement of the funding. All went well without any significant friction among community members.

In addition to the fast implementation of construction (the main concrete and roof structures were completed on over 95% of the totally destroyed and heavily damaged houses within the first year, (Tim Teknis Nasional 2007)), there was also significant improvement in the quality of construction, indicating that the communities had learned from their past mistakes. Field observations conducted during the construction process indicated that most if not all of the housing construction work was performed using the proper principles of concrete frame construction. In this case, all of the houses had enclosed plinth beams at the bottom and ring beams at the top connecting all columns (see Figure 3.75 for graphical representation of the recommended concrete frame with infill wall construction). Many of the houses even had added bracings to significantly improve the stiffness of the concrete frame structures against lateral loads. However, although there is not any hard data available, observations in the field reveal that many of the households also employed smaller rebar and stirrups than recommended.

Figure 3.75 A row of newly rebuilt houses revealing visible concrete frame structures (left) and ring and lintel beams in the interior that follow the recommendations. Pictures taken in early December 2006, seven months after the earthquake, reveal that reconstruction had progressed well ahead of the disbursement of government funding.
Despite the disaster prevention and preparedness campaigns and quality control mechanisms implemented through government facilitators during the reconstruction process, there are still lingering questions concerning the quality of the construction for three reasons. First, the amount of government funding provided was much too small for the reconstruction of permanent houses. IDR 15 million (roughly USD 1,500) per household could only cover the construction of a reinforced concrete frame of a roughly 36m² house. Second, there were simply not enough qualified facilitators whose main task was not only to supervise and provide technical assistance during the reconstruction process, but also to provide accountability for the funding being spent by the communities. Third, determining the quality of a reinforced concrete structure after its completion is both impractical and likely inaccurate. Likewise, fixing poorly completed concrete structures is both difficult and costly. When facing these kinds of problems during the reconstruction process, it is more likely that the facilitators would have tended to give passing marks on the quality control checks so the homeowners could receive their money, even if the construction might not be fully compliant with the recommendations. It should be noted here that many of the households had begun rebuilding their permanent houses before the government funding had been disbursed, and thus without any technical supervision.

One obvious mistake that occurred during the reconstruction process in Java was the use of old foundations for new structures, without knowing exactly whether the foundations met the minimum requirements. In this case, new plinth beams and columns were simply cast on top of the old foundations (see Figure 3.76). Many households took this shortcut to cut construction costs, since it allowed them not only to reuse their old foundation, but also their old floor.

![Figure 3.76 An example of community efforts to reduce construction costs by using old foundations and floors. The reconstruction of this house and many others was started ahead of the disbursement of government funding, and therefore without any technical supervision](image)

Other mistakes found were larger stirrup spacing than the maximum recommendation, insufficient concrete cover, and inadequate jointing methods (see Figure 3.76). Smaller diameter rebars and stirrups were also found during the reconstruction process. The communities also often added more water than the recommended ratio (i.e., 1 PC:2 sand:3 stone aggregate) to make the hand mixing and casting of the concrete into the formwork easier. These construction mistakes could significantly reduce the quality of the concrete and therefore weaken the entire building structure. Unlike the problem of using the old foundations to cut construction costs, the latter construction mistakes were attributed to negligence and insufficient technical knowledge.
These examples are in line with the findings from a survey revealing the depth of technical understanding of the communities. The results show that in general, the communities know the conceptual requirements of reinforced concrete frame structures (e.g., the need for columns, plinth beams, and ring beams). However, some could hardly remember important details, such as stipulations regarding concrete covers, concrete mixture, and joints between structural members (Kodrat and Suryabtara, 2007).

Since the effective technical supervision of the reconstruction was up to each household, printed copies of self explanatory technical guidelines were needed and should have been distributed to every household. Such a document would also provide an important resource for future references when a community wants later to expand existing buildings. In this case, large posters or booklets would have been better than smaller posters that can be easily misplaced or lost.

Lessons Learned

Community-based reconstruction is encouraged in any disaster reconstruction program as it generally results in much better overall outcomes (Shelter Center and UN/OCHA, 2008). Community-driven reconstruction, although much slower in pace, tends to result in much more lively neighborhoods and communities. On the other hand, donor-driven reconstruction, which relies on professional contractors for implementation, tends to be faster, but may fail to preserve cultural values and the aspirations of the community. This can end up being a huge waste of resources in the long term (Barakat 2003; Sanderson and Sharma 2008).

There is no doubt that the more the communities are involved in the reconstruction process, the better the results, as they can have better control over both the design as well as pace of the construction progress, based on their needs and resources. In addition, involving the community at the center of the reconstruction process also provides an excellent opportunity to educate them about earthquake-resistant construction. The same level of technical knowledge cannot be obtained if they are not directly involved in the construction process, such as when housing units are provided by contractors (Sanderson and Sharma, 2008). This may lead to the recreation of disaster-prone areas and the increase in community vulnerability in the future, as they eventually add other structures on their own over time.

In this regard, the Shelter Cluster Leader could play a significant role in the implementation of disaster risk reduction programs. This is because the local governments responsible for carrying out reconstruction programs are likely to be overwhelmed with the mounting tasks of responding to the emergency situation. Under these circumstances, the Shelter Cluster Leader can step in to bridge the gap between what needs to be done and the government’s ability to respond.

Without undermining government efforts in capacity building programs, it will take time before the construction standards can be implemented effectively. Therefore, considering the current construction practices (i.e., anyone can build a private house) and weak formal supervision provided by the government, disaster risk reduction programs should be targeted directly to the affected communities. This ought to be the priority of the Shelter Cluster Leader in the future. Investing much more resources in this program would not be a waste as a successful shelter reconstruction process will significantly influence the outcomes of the recovery process and reduce the vulnerability of the communities to potential risks.

The success of a disaster risk reduction program is measured based on three important factors. First, the program must be implemented at the right time to have the maximum impact. It must be done before the reconstruction work has started and soon after the disaster occurs. Fresh memories of the disaster will cause any disaster risk communication to be highly effective. This is consistent with the findings of two independent surveys on the willingness of communities to apply the technical guidelines for the reconstruction of the permanent houses (Center for Population and Policy Studies UGM 2007; Kodrat and Suryabtara, 2007). These technical guidelines, which increase construction costs, would not have been followed had the communities not experienced a disaster.
The second factor is good coordination between the Shelter Cluster Leader and the local government, and among agencies within the Shelter Cluster itself. The government and other local partners have the know-how of the local culture and construction practices as well as the infrastructure to distribute information effectively. The Shelter Cluster Leader, on the other hand, has the experience and capabilities of producing effective campaign materials in different formats and media. Combining the strength of each party would result in an effective disaster risk reduction program. Good coordination is also needed to avoid any conflicting information that may confuse the communities.

The third important factor is iteration of information. Communities have different backgrounds with different abilities to absorb and understand information. Receiving repetitive information on the same issues through different methods and media would improve the community’s understanding and retention of the information being conveyed (Snow 1976; Péladau et al. 2003).

The experience from the Java case shows that the affected communities have different ways of obtaining information regarding seismic construction. Posters, leaflets, and booklets are very effective for disseminating information to communities. Durable large posters with self explanatory and easy to understand information are much better than small leaflets, since the latter can be easily misplaced. Field observations more than two years after the earthquake show that many household still have these posters and booklets available for future reference. There was a report of a sharp increase in local newspaper circulation whenever materials were published related to construction guidelines. This indicates both the effectiveness of popular newspapers for disseminating information and the communities’ interest in and willingness to "build back better." TV and radio talk shows with large regular audiences were also used in Java disaster risk reduction programs.

In addition to the content of the information being conveyed, the methods of delivering that information and the timing of the implementation of disaster risk reduction programs is also crucial. For some reason, the implementation of disaster risk reduction programs related to earthquake-resistant construction guidelines was way too late in Java. Given its critical role in post-disaster housing reconstruction, and in reducing communities’ future vulnerability (ALNAP, 2008), disaster risk reduction programs should become a priority on the Shelter Cluster agenda and implemented sooner rather than later to ensure maximum impact. Training modules that can be accessed and modified to adapt to local conditions are widely available on the web. Therefore, the preparation of the disaster risk reduction materials in the future should be able to occur in a relatively short time.

**CASE 3.4.3. Raising the Disaster Awareness of Children: A Pilot Project of Iza! Kaeru Caravan for Yogyakarta**

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**Introduction**

Based on the spirit of preparing children (and entire families) to face disasters, the cases chosen for implementing this program, so far, have focused on children in elementary schools. Moreover, because the idea of the Iza! Kaeru Caravan comes from Japanese culture; it needs to be adjusted to the character of local communities where it is used. As a result, the pilot project should be conducted to find appropriate channels for implementation.

Pilot projects have been conducted in the City of Yogyakarta (Taman Siswa Elementary School) and Sleman Regency (Budi Mulia Dua Elementary School). These two areas were chosen for the pilot project because the children in both of these areas did not have the same level of traumatic experience as the children of Bantul Regency, the most heavily damaged area following the disastrous Yogyakarta Earthquake. The selection of these two areas was also consistent with the original concept of Iza! Kaeru Caravan program: that it is not intended to be directed at disaster victims.
**Description of the Project**

**Objectives and Background: Disaster Awareness in Children’s Education**

Children are assets for future involvement in real-world problems in their local communities. A public education in which children have linkages to community-based risk reduction efforts promises the development of a “culture of safety,” and to societies less vulnerable and more resilient to the impact of disasters in the future (Petal and Izadkhah, 2008, 4). Public education for disaster awareness is the process of making the public aware of the risks and preparing citizens for hazards in advance of a disaster and as a long-term strategic effort (EMAP, 2006, 7).

Disaster awareness programs for children’s education should be developed such that children can learn techniques and knowledge regarding disaster reduction while having fun, using such media as picture books, picture-card shows, and games. A new kind of children’s disaster drill program can help children and their parents acquire the skills and information they will need in the case of an emergency. This children’s disaster drill program was developed at the time of 10th anniversary of the 2005 Great Hanshin-Awaji earthquake in Kobe, and is known as “Iza! Kaeru Caravan”.

“Iza! Kaeru Caravan” is a disaster reduction event that is based on “Kaekko Bazaar”—a fun toy exchange (bazaar) program developed by an artist, Mr. Fuji, in 2000. The “Kaekko Bazaar” has a frog mascot to attract children since “kaeru” the basic word of “kaekko” has two meanings: “frog” (the mascot) and “exchange” (the bazaar system). The first event in 2005 was held at a big gymnasium in Kobe, and the program was called “Kobe Kaeru Caravan.” The first event in Kobe was jointly developed by Mr. Fuji and Plus Arts (an NPO). However, since the first Kobe event, this program has been conducted several times in Kobe and elsewhere, so the name was changed to “Iza! Kaeru Caravan”. The word “Iza!” meaning “emergency,” replaced the word “Kobe” before “Kaeru Caravan.”

The aim of “Iza! Kaeru Caravan” is to preserve and communicate the memories, knowledge, and lessons gained by the victims of Great Hanshin-Awaji earthquake, which occurred 15 years ago, to families not only in Kobe and the Kansai area, but all around Japan. The ultimate goal is to communicate past

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disaster experiences to children, the leaders of the next generation, so they will be fully aware of future disasters as they grow into adults.

The program soon became popular among Japanese children and has been held 43 times in Kobe, Yokohama, Niigata, Miyazaki, Tokyo, and other areas. It was decided that the Iza! Kaera Caravan should be introduced abroad (outside Japan) to Yogyakarta, Indonesia after the area suffered from the devastating earthquake of 27 May 2006. This first overseas version of Iza! Kaeru Caravan was started in 2008 and two events have been conducted since then. The program is still under development so that it can be sustained and make ongoing contributions to the disaster awareness of children in Indonesia.

**Period of Program Implementation, Target Audience, and Lead Agency**

The program is divided into three phases: (a) Pre-Project Implementation; (b) Pilot Project Implementation, and (c) Project Implementation, as described in the diagram below.

First contact was made between NPO Arts and the Department of Architecture and Planning at Gadjah Mada University (UGM) in October 2007. It was then that work began on Pre-Project Implementation. Preparations were led by the Department of Architecture and Planning, Gadjah Mada University, with support from the NPO Arts team, including Mr. Fuji (the artist) and University Professor Narumi. Within UGM, we also received support from the Children’s Hospital staff in the Faculty of Medicine. We discussed who “Iza! Kaeru Caravan” works, the objectives of the program, and issues and problems related to implementation. We are currently in the Pilot Project Implementation stage, which is scheduled to end in March 2010. During the Pilot Project Implementation stage, the UGM team has been working on:

- Developing Pilot Project 1 to hold the first version of Iza! Kaeru Caravan (with full support from NPO Arts Japan).
- Studying the experiences of the Yogyakarta community in the 2006 earthquake (with the involvement of students and social researchers).
- Developing Pilot Project 2 to localize the original Iza! Kaeru Caravan (with the help of local NGO Yayasan Griya Mandiri), and evaluating the results.
- Planning to empower local NGOs to conduct local versions of Iza! Kaeru Caravan in 2009.
- Preparing a proposal for multi-year funding for 2010-2013.
The next stage is Project Implementation and this will be very much influenced by the implementation, study, and evaluation of the pilot projects. Project Implementation is aimed at developing public education for children concerning disaster awareness in Indonesia through the use of a local version of Iza! Kaeru Caravan.

Reviews and Evaluation

Iza! Kaeru Caravan is based on the system of the “Kaekko Bazaar,” a fun toy exchange program. Children bring their unwanted toys to the Kaekko site. The cashier at the bazaar bank decides how many Kaeru points (from 1 to 3) to assign each toy provided, and then issues the child Kaekko cards stamped which the number of Kaeru points earned. Children can enjoy shopping at the Kaekko shop with the Kaeru points they have earned. If they want to collect more points, they can join disaster reduction programs (where they can win 1-3 points). “Iza! Kaeru Caravan” is comprised of six to eight programs that teach children about disaster reduction while playing fun games. Moreover, if a child brings a really impressive toy valued at more than 3 points, the bank cashier will stamp Kaeru points accordingly on the Kaekko card. Toys tagged as “impressive” go to the Kaekko Auction, which starts 30 minutes before the end of Kaekko. To participate in the auction, children stay at the site and participate in the activities over and over again to earn points.

In principle, the “Iza! Kaeru Caravan,” based on the “Kaekko Bazaar,” is a program that allows children to actively participate in disaster reduction training.

The Gadjah Mada University team, lead by the department of Architecture and Planning, implemented two pilot project events to promote children’s disaster awareness through Iza! Kaeru Caravan. They will continue to hold these events until March 2010 so that a more localized version of Iza! Kaeru Caravan can be developed. To localize the program, we have been working on learning about how people lived and survived during the Yogyakarta Earthquake of 27 May 2006. From these lessons, we have been developing fun games and activities to be included as part of Iza! Kaeru Caravan for the Yogyakarta context specifically, and Indonesia more generally. This approach was adopted based on the experience of NPO Arts Director Hirokazu Nagata:

Fun disaster reduction programs held at the “Iza! Kaeru Caravan” were created based on the lessons, knowledge, and techniques related to disaster reduction which were extracted from the interviews of 167 victims of the Hanshin-Awaji earthquake. Many student volunteers, artists, and architects were involved in developing these programs. Many are now taught to students in elementary schools in Kobe, as part of their classes.

Although the Yogyakarta team has not finished its interviews, it is continuously working on localizing the Iza! Kaeru Caravan content.

The Iza! Kaeru Caravan is an education program for disaster awareness under the license of Kaekko International Organization. However, some adjustments must be made to accommodate local conditions and the local character in order for the program to achieve its objectives effectively. During the Pilot Project Implementation, this activity was divided into several easy steps, as shown in the picture below:
1. The Kaekko Bank and Kaekko Shop

To encourage participation, children should bring any kind of toys to be sold at Iza! Kaeru Caravan. The cashier at the Kaekko Bank gives each toy a value represented by a number of points (stamps). Participants can use points as their assets for participating in games. They can add to their points through their achievements in various games. The accumulated points can be used to ‘buy’ toys at the Kaekko Shop. In the original concept, participants could play different roles, serving as cashier at the Kaekko Bank or as a player in several of the games.

2. Game Land

Some of the games used in the pilot projects were modified from the original versions. Adjustments were made based on the game content.

a. Pre-earthquake game zone
   - Lorong serba tahu/Know-how corridor (with illustrations and general information about earthquakes)
   - Bekalku/My supplies (lessons about preparing supplies for emergencies)

b. Emergency game zone
   - Lari ke mana?/Where will we escape to? (lessons about safe evacuation routes and emergency shelters)
   - Tandu si kodok/Stretcher for the frog (lessons about cooperation in helping victims)
   - Ubet-ubet/First-aid bandage (lessons about first-aid for minor injuries)
   - Balap air/Water race (lessons about cooperation in extinguishing fires)
   - Tusuk pincuk/Folded leaf (lessons about cooperation in preparing food for victims)

c. Post-earthquake game zone
   - Tenda bamboo/Bamboo tent (lessons about creating simple shelters)
   - Rumah pipa/House of pipe (lessons about creating simple shelters)
   - Rumah impianku/My dream house (stimulating ideas about the ideal house that will be safe during an earthquake)

The new ideas that were not used in the original version of Iza! Kaeru Caravan included lorong serba tahu, balap air, and rumah pipa. Some of the games were localized using materials and knowledge specific to Yogyakarta, such as ubet-ubet, bekalku, and tusuk pincuk. Some were adopted as-is from the original, such as tandu si kodok. Special rewards (emblem sakti) were given for participants who were able to complete at least two games in each zone.
d. Auction

Finally, the activity concluded with an auction of high quality toys. Participants were able to bid against one another to get the toys, with the winner being the child bidding the highest price, that is, the highest number of points.

Figure 3.80 Iza! Kaeru Caravan is held in Yogyakarta

Lessons Learned

From the two pilot projects, we learned that the children actively participated in the program. Based on their evaluations, they understood the ideas behind each of the fun games introduced in the Iza! Kaeru Caravan. The most crucial part of the development of disaster awareness education materials for children is to understand the local needs and the educational practices used in other places. Yogyakarta we had to learn from the experiences of others. Therefore, a joint team of representatives from UGM, Yayasan Griya Mandiri, and NPO Art should work together intensively to develop better local content, develop an organizational structure for holding events, and promote the activity to a wider audience of stakeholders.

Concluding Remarks

Since the program is still underway, concluding remarks cannot yet be made. The Pilot Project Implementation stage will have to be completed before any conclusions can be drawn.

3.5. Gender-Based Intervention

Budi Andayani Koentjoro

Introduction

Reports indicate that the 2006 earthquake resulted in extensive psycho-social damage and losses, with as many as 879 suffering Post-Traumatic Stress Disorder (PTSD). As many as 1,227 people suffered higher-level stress, while only 64 were categorized as experiencing lower-level stress. This shows that many people were affected psychologically by the shock. The stress experienced by the victims was caused not only caused by the shock itself, but also by the losses people suffered as a result of the earthquake. Reports noted that 1,508 people needed medical attention, 4,480 people perished, more than 150,000 were handicapped or injured, and 133,606 houses were ruined or severely damaged.
These losses, in addition to the physical and infrastructure damage, also created economic losses. Many people in non-agricultural work lost their jobs. Bantul is known to be a center for several handicraft industries, and these were also affected by the earthquake (Ministry of Culture and Tourism of RI, 2006).

The earthquake affected family life in many ways. Many families lost their economic providers due to death, injury, or handicap. Handicaps consisted mostly of broken spines. Unfortunately, most of those suffering this handicap were men and this made them unable to play the role of economic provider for their families. They also lost their incomes because of the damage sustained by their property and assets. Economic dependence on aid has become the main psycho-social problem.

Facts, Initial Needs, and Priorities

The fact that survivors have to continue to live and that they are supposed to be more autonomous in continuing their lives (e.g. people’s economic autonomy should be considered). Programs focusing on community development and community empowerment, however, should consider the existing cultural capital in the community. Moreover, community empowerment is based on the empowerment of the family as unit, and thus should focus on efforts to improve the situation at the family level. The discussion below will focus on cultural values basically from the perspective of family life.

The Javanese people value harmony. Harmony is achieved through cooperation, when people work together and help one another. This value, rukun in Javanese, is demonstrated on many occasions, particularly when there is some communal interest in the outcome. People work together in building or repairing a neighbor’s house, women work together preparing food or accessories for cultural ceremonies, e.g., weddings, circumcisions, and burial processions. This value serves as cultural capital that helps a community survive difficult times.

The value of harmony is also important in families. The Javanese term for spouse is garwa, and it is an abbreviation of sigaraning nyawa, meaning part of the soul. Spouses are small groups in a community and thus, a division of labor is considered the best arrangement for spouses to function well. Such a division of labor is perceived as positive sign since spouses share life in the unity of soul. Wives are often being addressed as kanca wingking, “a friend back stage,” since women often take on the domestic roles, but husbands are never addressed as kanca ngajeng, “a friend front stage” even though they have a role in public domain, that is, as the providers for their families.

Such a division of labor, however, is not very evident today, even in poor communities. Ordinarily, men and women are all struggling to survive, so they are all “fighting” in the same domain, the public domain. However, domestic matters are mainly women’s business, so in addition to doing their chores around the house, they also do domestic work for payment, such as doing laundry, selling food, or selling goods in the markets.

Villages have many activities for many groups of community members. Men have their own group meetings. Women also have many group meetings, including the PKK (the organization of housewives in the neighborhood), Dasa Wisma (a group of housewives of 10 households in the neighborhood), Pos Yandu Balita (community service for children under 5), and pengajian (Qur’anic study) and other religious meetings. The youth are also organized into groups called Karang Taruna and Remaja Masjid for those active in mosque activities. Considering the many kinds of gatherings in which women can participate, it seems that women are likely to be more ready to respond to any action in the community. Our experiences with community education activities show that most of the participants are women. Although this is not always beneficial when family participation is needed, in many cases, women are the best agents for change.

The earthquake made normal living impossible for everyone. Those with a better standard of living however, may have had financial savings in bank accounts or assets such as livestock or rice fields. The poor, on the other hand, lost their earnings and had nothing to use to continue normal living. Life had already been difficult for them and the disaster made it even worse. Nonetheless, the tradition that had
been there for centuries, that is, the tendency of men and women to do different kinds of jobs, presumably can make it easier for aid providers to support struggling communities.

**Framework of Intervention**

Eko Teguh Paripurno from the Centre for Disaster Management Study of UPN Veteran Yogyakarta (2007) defines a disaster as a serious disturbance in the functions of a community, which causes loss in all aspects of human living, including losses of property, losses of economic resources, or environmental damage that overwhelms the community's ability to cope with them.

This definition of disaster shows that a disaster will cause suffering among the people affected. Such suffering, however, is experienced differently by different people. Some will perceive the suffering as mild while others will perceive similar suffering as more severe. It is assumed that socioeconomic conditions, the availability of resources and livelihood activities, gender, age, job, social capital, and family relations significantly contribute to the way suffering is experienced.

Catastrophes and suffering will invite aid from many nations of the world. Ideally, aid will not only reduce suffering, but also will help communities become stronger and better able to autonomously handle difficulties. Aid should not create dependency on the part of survivors, and thus needs to be delivered wisely.

Sri Sultan Hamengku Buwono X (2006) stated that there are several phases to post-disaster management. It starts with the emergency response phase, followed by the recovery phase, the rehabilitation phase, and the reconstruction phase. The first week after a catastrophe is the emergency response phase. During this phase, the availability of food and water is very limited, and sanitation is poor. Fear, pain, and environmental damage limits access to the outside, creating a sense of helplessness and uncertainty. Rumors are easily started and easily affect people.

It is very important to consider strategies for the management and delivery of food and basic needs. Uncertainty and rumors can make people become more aggressive in an effort to get aid, causing them to ignore ethics and etiquette.

In the case of the earthquake in Yogyakarta, the impact was harder on the poor because the earthquake struck close to the start of the new academic year. Many families were worried about the costs of schooling. Any extra money would have had to go toward school fees, uniforms, and school supplies. Given the timing of the disaster, it is therefore appropriate to provide support for schooling expenditures.

The recovery phase starts after the seventh day of the disaster and lasts until the end of the first month. This phase is supposed to be used for helping survivors return to normal life. The survivors are encouraged to make use of their own resources and to be motivated to meet their own needs. They are supposed to begin functioning again, either as individuals, as people with their own careers, as family members, as members of a community, and as religious people.

The issues that need to be considered in supporting the recovery process include the fulfilment of basic needs, feelings of loss, fear, helplessness, and the survivors' resources. The poorer the person, the greater will be their feeling of loss, fear, and helplessness. A lack of resources to fall back on makes the trauma greater. Support should focus on creating autonomy in basic-needs fulfilment.

The rehabilitation phase starts after the first month and lasts for six months (months 2-7). After the survivors have recovered, they are encouraged and motivated to restart their lives. During this phase, feelings of helplessness often reappear when the victims see the empty ruins of houses. Recreational but productive activities seem to be appropriate for survivors.

The reconstruction phase lasts from seven months to two years after the disaster. This is the culmination phase of the entire disaster response. During this phase, feelings of injustice appear so
often that monitoring is required in the delivery of basic-needs fulfilment and aid for capacity building should be controlled.

Clearly, planning for intervention must consider many aspects of the survivors. These include the current response phase, psycho-social conditions, socioeconomic status, the resources available, and the victims themselves. The figure 3.81 below shows the aspects to be considered in intervention planning.

Since women are powerful agents of change in Indonesia, and particularly in Bantul and Panggang Regencies, involving women in community empowerment is the best approach. Such an approach is supported by the tendencies of women to take care of domestic matters, and the common habit of women to attend women's gatherings.

**Strategy and Current Status**

Support and help for survivors of natural disasters should consider the perspective of helping behavior. Helping can be divided into two types. Charity is about giving things away, while a non-charitable gift is reflective of a more well-planned provision of aid. Helping or supportive behaviors can be characterized by who is doing the giving, what is being given, when the giving is happening, the method of delivery, and the recipients of the support. Different kinds of helping behavior have different impacts on the recipients.

Considering that the family unit should be supported economically, actions should be taken to enhance family autonomy in providing for their own needs. There is a saying that says, “If you want to help someone survive, don’t give them fish, but a fishing rod.” Thus, charity aid is best only for the initial phase of emergency response. Such charity should not be prolonged once the community has recovered from the shock and is able to continue on with relatively normal life. People should be encouraged to stand on their own feet, finding any resources (particularly natural resources) available to sustain them.

It should be noted however, that during the recovery phase, men are given more attention in the physical repair of houses and the residential environment. Thus, women also need to get into the action of making economic contributions. However, involving women in economic activities should not keep them away from their families. Thus, home industries are the best alternative for economic empowerment programs.
It is also important to make note of the kind of work familiar to people in a certain community. Our experiences with people of poor communities not used to performing skilled labor reveal that doing types of work different from those a person is used to require more motivation. When people have no “heart” for doing a certain kind of work, it will be useless for them to learn to do such work. Once we considered teaching the people of Panggang to learn how to do crafting activities using tree trunks that had once been sold as firewood. The idea was that they would probably be able to earn more money from selling the wood as handicrafts than in selling it as firewood. Some of the men agreed to participate in the workshop, but did not show up when the trainer came. Interestingly, a key-person made a statement about this, saying “…We do not want to be empowered; we prefer more concrete aid…” This showed that the people were resistant to engage in new activities unfamiliar to them, even if those activities would potentially be more lucrative in the future.

One excellent example of economic support is the support given by Jogja Heritage Foundation and Paguyuban Pecinta Batik Indonesia (Indonesian Batik-Lover Association) Sekar Jagad, for women in Imogiri who were used to making batik fabrics for a living (Kedaulatan Rakyat online, 28 June 2006). Many batik painters could not continue painting because the earthquake damaged their painting equipment. Empowering a community within an existing framework, is the best strategy for helping families continue to survive without damaging their self-esteem.

Another example of a similar attempt came from a group of psychologists in the organization Dua Rajawali Perkasa Jakarta, which helped the women in the Minggir area work together in a home industry producing emping (crackers) from mlinjo and garut, ingredients available in the environment. Although this project does not seem to be ongoing today, the activity helped families earn some money during some economically difficult times.

**Challenges and Advantages**

Empowering people through community development appears to have some challenges. As mentioned above, the challenges tend to come from the people themselves. Are the people highly motivated to improve their own lives by doing work that may offer greater future prospects? Do people notice opportunities to earn more money by processing raw materials into more valuable products, rather than selling them as raw materials (e.g., wood, mlinjo and garut)? Are people willing to be challenged to do new things beyond the work they are accustomed to?

These kinds of challenges require aid-giving organizations to consider and wisely plan strategies to motivate people as they develop their programs. Community development programs also should only take action after conducting a needs assessment and assessment of the available natural resources to ensure that the programs will be appropriate and effective.

Although it was not obviously apparent, cultural capital seems to help people recover in a shorter time. A sense of togetherness and a common fate helped people accept their shared misfortune. This acceptance also made it easier for organizations to offer intervention, since people were not too self-focused and was able to focus their attention on what needed to be done in order to survive.

**Lesson Learned**

Recovery work is not only about the physical reconstruction of houses and the infrastructure. It also includes the restoration of people’s lives and livelihoods. The provision of aid should consider many factors, such as the phase of post-disaster response, the pre-disaster socioeconomic condition of a community, the kind of aid needed (psychological, medical, social, physical, or cultural), and the delivery strategy (charity or non-charitable gift). Local cultures may facilitate or impede support, and thus need to be understood and wisely considered in all program planning.

Men and women are different in ways that can be helpful, and this should be considered when planning an aid delivery strategy.
3.6. Infrastructure

Infrastructure rehabilitation is divided into three parts: reconstruction and rehabilitation of transportation facilities (roads and bridges), recovery of energy facilities (electricity and telecommunication), and recovery of irrigation systems.

- The impact of the earthquake on public and private infrastructure was relatively limited, with the value of damage and losses estimated at Rp 397 billion and Rp 153.8 billion, respectively. The sector worst affected was energy, with damage to electricity transmission and distribution facilities estimated at a total Rp 225 billion and losses due to physical damage at a further Rp 150 billion.
- In the transportation sector, there was widespread but minor damage to roads, and localized damage to Yogyakarta’s airport and mainline railway tracks and associated infrastructure. Total damage was estimated at Rp 90.2 billion. Most of the road damage (80%) occurred on provincial and district roads, two-thirds of which were located in the districts of Sleman and Bantul.
- Total damage and losses in the water supply and sanitation sector were estimated at Rp 85.6 billion, mostly due to damage to shallow wells, the main source of water for 70-95% of villages in both Yogyakarta and Central Java Provinces.
- Telecommunications and postal services suffered very limited damage, principally to base stations for mobile and fixed wireless-access phone services and to some buildings.

The main funding for repairing the water and sanitation system, energy facilities, health care centers, and government buildings was taken from the national and regional yearly budgets.

Water, Sanitation, and Irrigation

Damage and Losses

Initial reports from the district governments indicated that the availability of safe drinking water, sanitation facilities, and hygiene kits were identified as immediate priorities. Most sources of water in the affected areas were shallow wells. Preliminary assessments indicated that up to 20% of these might have been damaged or unusable, based on data gathered from the first few villages surveyed. There was also some indication that septic tanks had broken and might contaminate shallow aquifers. A small piped sewage system in Yogyakarta might also have ruptured. There was also a risk of contamination as sewage pipes are generally laid parallel to water mains, which could also have been broken. Only three of the 12 water treatment plants in Bantul District with capacities ranging from 5 to 40 liters per second were functioning after the quake, due to the disruption of electricity to the remaining nine plants. Water systems within the two most-affected districts (Bantul and Klaten) have been assessed as stable or returning to normal within the coming days. The total damage and losses in the water supply and sanitation sector were estimated at Rp 85.6 billion, which is rather limited compared with other sectors. Ninety percent of the water supply damage occurred in rural areas. Most of the damage appeared to be sustained by the water supply facilities rather than sanitation facilities. None of the existing piped water supply networks experienced significant damage. In the predominantly non-piped affected areas, immediate debris cleanup and costs of repairing wells was expected to amount to Rp 75.5 billion. In the early stage, limited information was available on sanitation infrastructure below the ground level.

- The supply of piped water in urban areas was disrupted for a few days mainly due to electricity outages, as about 90% of water was pumped from deep wells. In Yogyakarta, none of PDAM’s buildings, pumps, or wells was significantly damaged by the earthquake, and quick repair work was undertaken to maintain the water supply. However, the water distribution network was damaged by an increase in physical leaks throughout the city, in particular in the most affected sub-districts of Umbulharjo, Mergangsan, Kota Gede and Mantri Jero. Temporary repairs at over 200 leak points had to be conducted. No report was available on damage to sewer lines when this assessment was conducted. While minor damage was reported at the wastewater treatment plant, the plant was still operating after the quake. Minor damage was also found at
the regional landfill site in Piyungan, serving the Greater Yogyakarta area, where a leaking leachate pond could potentially pollute the nearby river.

- In Bantul, two of the 12 deep wells were reportedly damaged, and two transmission pipe bridges collapsed. In Klaten, only about 50 household connections were disrupted. Both of these areas are predominantly semi-urban and rural districts with very few piped connections, and there was little damage to such connections. By contracts, given their higher prevalence, considerable damage to individual wells and toilets has been sustained. However, it appears that even where levels of housing destruction are very high, many wells, though filled with debris, remained structurally sound. Thus, the immediate cleaning costs may be substantial, but replacement and reconstruction costs should be limited. As an interim measure, households in heavily damaged areas reverted to the communal use of water and sanitation facilities of neighbors where these have been cleared of debris, and PDAMs provided water through tankers and public taps at evacuation sites.

- Information on septic tank damage was not yet available at the time of this assessment and might have an impact on water quality where these are constructed near wells. However, it is important to note that septic tank leakage into nearby wells was already a widespread problem before the earthquake.

- All PDAMs in the affected districts are likely to have experienced an increase in their operational and maintenance expenses due to immediate repair work. In Bantul, repair and rehabilitation work is constrained by the reduced capacity of the staff, as the houses of about 80% of the PDAM staff have either collapsed or been badly damaged.

Framework

UNICEF’s approach was to locate water containers in established locations, starting with the largest groups of people, while gathering information from other sectors and agencies located throughout the affected areas. Water authorities from adjacent districts provided water supply trucks to assist in the delivery of water, and operational funding was requested from UNICEF. Emergency water supply was implemented for all the areas where the affected population was no longer able to access traditional water sources. Sanitation facilities were needed throughout the area. Both water and sanitation facilities must be used properly until people can rebuild their homes so that there are no outbreaks of waterborne or sanitation-related diseases.

Current Status

High priority was given to the recovery of water facilities, especially the irrigation systems used to meet the daily needs of victims and to sustain agricultural activities, thereby reducing the risk of agricultural product degradation due to the earthquake. Rehabilitation and recovery funds came from the national and regional development funds, and donations from JIBC. As of September 2007, 25 of 46 damaged irrigation units had been restored. The recovery process was coordinated mainly by the government using a top-down approach.

Energy

Damage and Loss

The earthquake caused significant damage to the Pedan (Klaten District) extra-high-voltage substation, minor damage to 11 high-voltage substations, and widespread damage to medium- and low-voltage distribution networks and household connections. The supply of power to urban Yogyakarta was cut only briefly, and good progress had been made at the time of this assessment in reconnecting customers in rural areas whose buildings were still usable. There were no reports of damage to oil and gas installations. There were some reports of damage to roadside gas stations. Total damage and losses were estimated at Rp 325 billion and Rp 150 billion, respectively.
• The Pedan substation suffered damage to 500KV circuit breakers (3 sets), 500KV disconnecting switches (5 sets), 500KV/150KV transformers (2 sets) and a 500KV lightning arrester. The Central Java business unit reported damage to over 140,000 customer connections (out of a total of around 6.7 million), and to around 880 km of medium-voltage (30KV and 20KV) and 820 km of low-voltage distribution lines.

Current Status
As of September 2007, the extra-high-voltage and high-voltage substations have been repaired and restored. Good progress has been made, since all 59,598 household connections in Bantul and Yogyakarta Province have been restored.

Roads and Bridges
Damage and Loss
• There was widespread but generally minor damage to roads and bridges in the earthquake-affected areas. Total damage was estimated at Rp 45 billion based on road damage data provided by the provincial public works agencies. All important road links are now usable and there has been no significant impact on traffic speeds. Consequently, no significant additional losses were anticipated at the time of this assessment.
• Damage to roads included transverse and longitudinal cracking. Sections of roadway suffered minor subsidence and pavement deformation mainly due to the failure of retaining walls. Damage to bridges included longitudinal cracking of deck slabs and the unfastening of expansion joints. There was also some subsidence on bridge approaches.
• Estimates of road and bridge damage costs are presented in the following table. Bridge damage accounted for 60% of the total costs, national roads for 16%, and provincial and district roads for 84%. Two-thirds of the damage to sub-national networks occurred in Bantul and Sleman.

Current Status
Though early reports on damage and losses to the infrastructure were low, the recovery of this sector is still not complete. It was reported that as of September 2007, only 35% of the total roads damaged had been repaired. It was also reported that 9 of 13 damaged bridges had been restored. Even though the restoration of the transportation infrastructure has been slow, reports also indicate that improvements are being made in the quality of transportation-related construction. This may mean that improvements are being made in the quality of the roads and bridges with regard to disaster prevention.

Schools
Damage and Loss
• The earthquake had a major impact on the education sector. In Yogyakarta some 2,155 educational facilities were damaged or destroyed. Bantul Regency, Yogyakarta, was the most severely affected regency with 949, or over 90% of its educational buildings damaged. Klaten District experienced the highest level of damage in this province, with 64 buildings destroyed and 257 buildings severely damaged, representing about 38% of the buildings in the district. At the time of this assessment, 36 teachers had been reported killed, with twice as many injured.
• The quality of school buildings was a major factor in the high level of destruction. Many social sector buildings, in particular elementary schools in rural areas, were built in the 1970s with special government grants. Following major improvements in infant and child mortality rates, schools had to be built quickly to accommodate the significantly larger number of children ready to enter elementary school. Since enforcement of building codes was minimal, maximizing the use of funds for the growing number of school children took priority over conformity with anti-seismic and other safety standards.
• Estimates of the costs of utilizing temporary school premises, recruiting and training of new teachers, paying temporary teachers, and cleaning debris from the affected premises were calculated. These were considered losses for the medium term, until the education system could be brought back to normal operations.

Current Status

The most highly affected school buildings in Yogyakarta were kindergartens. As of September 2007, it was reported that 50% of 509 kindergarten buildings had been reconstructed by the government. It is possible that more kindergartens have also been restored by non-governmental organizations, since most kindergartens are privately owned.

CASE 3.6.1. Rebuilding Giwangan State Elementary School in Yogyakarta and Kabregan State Elementary School in Bantul As A Corporate Social Responsibility Project Of The Indonesian Bank Association (PERBANAS) For Schoolchildren Victims Of The Earthquake

THOMAS WIDIANTO
Indonesian Bank Association (Perbanas)

AGUNG WITJAKSONO
Indonesian Bank Association (Perbanas)

Giwangan State Elementary School and Kabregan State Elementary School (Area)

The Indonesian Bank Association (PERBANAS) decided to rebuild two schools affected by the 2006 Yogyakarta Earthquake as part of its corporate social responsibility activities. To determine which schools should be the target of this project, PERBANAS looked at several factors and conducted on-the-spot surveys in locations initially identified. PERBANAS is trying to help the schools that really need it by working both independently and in coordination with the Yogyakarta City Regional Government (PEMDA), Bantul Regency Regional Government (Educational Office), and a team from the Architectural and Engineering Faculty of Gajah Mada University (UGM). PERBANAS selected two elementary schools from among the hundreds in Yogyakarta City and Bantul Regency that were damaged by the earthquake. These two were determined to be suitable for restoration using budget funds allocated by the Central PERBANAS Board in Jakarta.

The following two schools were selected.

1. Giwangan State Elementary School, Yogyakarta

   This school is located at Tegalturi Street no. 45, Giwangan Village, Giwangan District, Yogyakarta City. Tegalturi street connects Karangkajen and Kotagede. At the west end of the street are Wirosaban Regional Public Hospital (RSUD) and Hygienic Fish Market, while at the other end lies Kotagede, the region’s industrial center for silver crafts. It’s strategic value in terms of its location, as well as its status as a core school in Yogyakarta City, makes it a school of choice for people in the area (Giwangan, Wirosaban, and Kotagede). When the earthquake struck, the school had 413 registered students (average of 34 students in each class) and 52 teachers. As a result of the tectonic earthquake on 27 May 2006, the school building, which stood on a Sultanate Ground (SG) array 3,700 m2, was completely destroyed (100%). After the earthquake, learning-teaching activities continued to be conducted in emergency tents set up at the school site.

2. Kabregan State Elementary School (SDN)

   This school is located at Wonosari Street KM 13, Kabregan Village, Srimulyo Village, Piyungan District, Bantul Regency. Wonosari Street is a provincial street that connects Yogyakarta City with Wonosari, the capital of Gunungkidul Regency. This area suffered the worst damage caused by overflow from Opak River. The school building in Srimulyo Village, with an area of 1,600 m2, was completely
When the earthquake struck, the school had 180 registered students (average of 30 students in each class) and 12 teachers. After the disaster, learning-teaching activities continued to be conducted in emergency tents.

**Description of the Project**

PERBANAS chose these two schools as the focus for its rebuilding effort based on its commitment to fulfill its corporate social responsibility by advancing education in Indonesia. To realize its goals, PERBANAS established several criteria that the schools would have to meet. The schools selected had to have been completely destroyed (100%), and had to have a good record of past performance and the potential for future development. This was determined by looking at the number of students enrolled and determining if that number was still ideal/feasible for an effective learning-teaching process. In giving aid, PERBANAS focused on the reconstruction of school buildings to meet earthquake-resistance standards. Other educational facilities can still reuse the existing materials.

The reconstruction of Giwangan State Elementary School was launched at a first-stone-laying ceremony on 28 August 2006, led by Mayor of Yogyakarta Mr. Herry Zudianto, and PERBANAS Chairman Sigit Pramono. The reconstruction of Kabregan State Elementary School was launched on 12 October 2006 by Bantul Vice Regent and PERBANAS Organizational Chairman, LG Rompas. Both schools were completely rebuilt and transferred to their respective regional governments on 2 March 2007 in Jakarta at a PERBANAS new logo launch event. To meet the objectives of both projects, PERBANAS worked with several parties, including the Architectural Engineering Faculty of Gajah Mada University, which provided a design consultant team and supervisory consultant team, PT Gema Cipta Artindo, who served as the development supervisor of Giwangan State Elementary School, and CV Mitra Mandiri, who served as the development supervisor of Kabregan State Elementary School.

A person within the team from the Architectural Engineering Faculty of Gajah Mada University was appointed as a consultant due to its reputation of doing quality job. The selection of both contractors was done by appointment based on the opinions expressed by the consultant, as well as those expressed by the PERBANAS team. Selections were made from among the contractors proposed by the Regional Government (PEMDA) and the Indonesian National Entrepreneur Association (GAPENSI). This was done to save both time and money. In other words, cheaper price is not the primary consideration but building specifications that meet the standards, suitable to anti-quake educational facilities. To enable the project to really benefit the local people, PERBANAS urged the selected contractors to use local labor as much as possible to empower the local community.

From a legal perspective, a Cooperation Agreement (PKS) between PERBANAS and the Yogyakarta City Regional Government was signed on 28 August 2006 while the PKS with the Bantul Regency Regional Government was signed on 12 October 2006. As the owner of a school to be built by PERBANAS, PEMDA established some criteria related to the shape, function, and minimum number of rooms to be provided by PERBANAS.

According to the PKS, the development of both schools was not only to be aimed at restoring the schools to their pre-earthquake status, but at building the schools to be even more optimal for future educational activities. Thus, in addition to classrooms, the schools were designed to include a computer lab and a language lab. State Giwangan Elementary School was built with 12 classrooms, a language lab, computer lab, library, teacher’s room, headmaster’s office, school park, canteen, and bathing/washing/lavatory (MCK) room. Kabregan State Elementary School was built with six classrooms, a language lab, computer lab, library, teacher’s room, headmaster’s office, mosque, and MCK room. Concrete block was used in both school yards. The total funds allocated by PERBANAS for the reconstruction of both schools were IDR 2,104,459,000.
**Review and Evaluation**

During the construction process, daily activity reports on both schools were issued by the supervisory consultant, and these were monitored weekly by the PERBANAS team and School Committee. This ensured that any problems that arose in the construction process could be promptly addressed. The PERBANAS team also conducted random inspections to directly monitor the situation and to cross check the items reported by supervisory consultant.

The duration agreed upon between the contractor and PERBANAS for the completion of both projects recorded to supervise the progress of implementation. In the purchase order issued to each contactor, PERBANAS indicated project duration of 120 calendar days for project completion, with a subsequent maintenance period (retention) of 90 days.

As a control device, PERBANAS paid the contractors in several installments. Payments were only made to contractors when they had achieved progress on the project identified as meeting 33%, 70%, and 100% of total project completion. On each invoice to PERBANAS, the contractors had to attach a Job Supervision Letter issued by the supervisory consultant.

**Lesson Learned**

In response to the earthquake in Yogyakarta, PERBANAS, an institution that covers national public banks, focused aid on shelter and education. This is based on the idea that education establishes the foundation for a nation to advance.

In selecting the schools that it wanted to support, PERBANAS established several criteria that the schools would have to meet. The schools selected had to have been completely destroyed (100%) by the earthquake, and had to have a good record of past performance (core elementary school) and the potential for future development. The latter was based on ideal student numbers for achieving an effective learning environment.

PERBANAS always follow the regulations for disbursing aid. Good cooperation with PEMDA, the school owner, was the key issue. Other parties involved in the execution of the project were the Architectural and Engineering Faculty of UGM in the roles of design consultant and supervisory consultant, independent construction contractors, local construction workers hired by the contractors, and the School Committee, which also played a role in supervising the project.

The reconstruction of physical facilities was designed to optimize the learning-teaching process at these school in the future. Thus, the schools were designed to meet not only their pre-earthquake specifications, but also to include a new computer lab and language lab.

Supervision and evaluation were carried out routinely by all parties involved to monitor progress on the project.
CHAPTER 4: THE ROLE OF SOCIAL CAPITAL IN YOGYAKARTA EARTHQUAKE RECOVERY

The Role of Social Capital for Yogyakarta Post-Earthquake Reconstruction

It is believed that the reconstruction effort conducted in Yogyakarta and Central Java was the largest, fastest, and most efficient post-disaster housing program ever implemented through community participation. Coordinating Minister for the Economy Budiono stated that a year after the disaster, 90% of earthquake survivors were living in permanent housing while the only 10% continued to live in temporary shelters. He highlighted the importance of community participation by explaining that within six months, 55% of the government budget for reconstructing 282,000 houses had been spent (Rp. 5.4 trillion), but the facts showed that 62% of the planned housing units had actually been built (TTN, 2007:11). This situation was also noted by the Java Reconstruction Fund (JRF), as compared with the reconstruction programs undertaken in Aceh and Nias. The relatively rapid rollout of the housing program in Java (as compared with Aceh and Nias), combined with the personal resource investments of families, and the community solidarity demonstrated in rebuilding permanent houses, yielded quick results on the ground (JRF, 2007:12).

One of the key successes of the Java post-disaster reconstruction effort was the synergetic cooperation achieved between the government, with its supportive post-disaster policies, and various institutions and donors (national and international), with their concrete plans and activities for filling the gap between government provisions and community needs, and strong community participation reflected in the Indonesian term modal sosial - social capital.

The word “social” is primarily related to human society rather than the individual. It refers to how people come together and live with one another in a group or community setting by taking into account the behaviors of others. But the term “capital” is commonly used in association with issues of production.

The term modal sosial, according to Idham Samawi (2008), the bupati, or regent of the most devastated area of the 2006 Java Earthquake, refers to a community ability to achieve a mutual goal based on spirit of togetherness, religious values, and local wisdom. He mentioned that customized activities such as helping people who are facing problem and difficulties, bersih dusun—literally means “clean village”—or other togetherness’ work for the better of their owned environment do not only show the strength of social tight but also indicate the strength of tolerance within the community. At the time of the 2006 Java Earthquake, Samawi also showed that evidence of the existence of modal sosial, and the kind of togetherness it implies, had been recorded by various witnesses and disseminated through the mass media, books, and photos, and even passed along by word of mouth. The people themselves proved the existence of modal sosial by forming spontaneous dapur umum (public kitchens) and pos ronda bersama (community security services), setting up poskos (community aid centers), and taking tangible, voluntary actions with communities outside the disaster area to help disaster survivors clear out the ruins of damaged houses and sort recyclable materials for reuse.

The Gotong Royong as Social Capital After the Earthquake

A more direct explanation of modal sosial in the reconstruction process, which many people have mentioned, is a strong community tradition of so-called gotong royong, or a spirit of mutual cooperation to cope with community problems. A typical example of gotong royong in the post-earthquake recovery in Java is evident in the relationship between this social capital and Shelter/House Reconstruction Typology (see Figure 4.1).
The various models of gotong royong explain the various actors who are involved in the process of reconstructing various types of shelters/houses needed after an earthquake. The gotong royong among families, relatives, and Rukun Tetangga (RT: community neighborhood units) is evident when a community provides emergency shelter and accessible housing for families or individuals with disabilities. The expression of gotong royong in the provision of transitional shelters, core housing, and permanent housing, which must be compliant with earthquake resistant construction standards, has been achieved through community groups or PokMas (Kelompok Masyarakat) led by community and technical facilitators. Meanwhile, for more complex reconstruction efforts involving the use of specific technologies and materials, such as traditional housing reconstruction and the new monolithic dome housing units, needs to develop Project based participation with special instructor. The gotong royong model also depends on community networks. The strength of social capital is indicated by the networks that are present in a community, such as the social ties that exist in families and neighborhoods, professional associations, local community networks, and national and international networks.

**Community Disaster Response and Recovery as a Source of Learning**

The experiences of the provinces of Yogyakarta and Central Java in the earthquake response and recovery processes have definitely become a source of learning that can be used to prepare for future disasters in this region and others. Post-earthquake activities can be divided into four categories:

- **Processes related to engineering and housing reconstruction**
  From the community capacity building (e.g. socialization and on-the-spot training of earthquake-resistant housing such as penyuluhan and pelatihan teknis), re-usable materials (cf. recycled material model: Merantasi) were introduced; direct practice of Earthquake resistant construction on transitional shelters, core housing and permanent housing construction facilitated a more specific house construction models such as traditional housing reconstruction and new imported dome housing construction.

- **Reconstruction of public facilities and important cultural monuments**
  Unlike housing reconstruction, more comprehensive reconstruction should be managed to reconstruct public facilities such as hospital, schools, and markets. Cultural heritage sites, such as Yogyakarta Palace and the Prambanan Temple Compounds, also were of immediate concern to the government and local donors.

- **Revival of community livelihood**
  The villages or districts characterized by many home-based businesses, such as Batik dyeing, ceramics making, and silversmithing, have been the primary targets of efforts to revive community economies since the earthquake. Livelihood revival programs have included a
program to develop more efficient kilns undertaken in Kasongan ceramic village, and a small industry revival program implemented in Kotagede.

- Post-earthquake systems management
  One of the key reasons for the success of the post-earthquake response was the effectiveness of activities undertaken by various institutions and organizations involved in disaster recovery efforts. The roles played by the central and local governments, NGOs, individual donors, and the private sector are central for empowering people and mobilizing resources.

The good practices and challenges faced during the implementation of post-earthquake response efforts in various sectors can definitely provide useful lessons for all peoples, communities, and institutions concerned with improving their capacity to prepare for disasters in their own regions. In this regard, it is important to disseminate the disaster and recovery experiences of Yogyakarta and Central Java to others.

**Completing the Cycle of Disaster Risk Reduction**

The Yogyakarta and Central Java experiences and achievements indicate how high the direct responses and recovery process during post earthquake. Those achievements should be used as lessons not only for disaster response and recovery efforts, but also for helping communities avoid risks and reduce the impacts of future disasters.

The “response” and “recovery” stages of a disaster are part of the classic model of disaster risk reduction (DRR), which also consists of the mitigation, prevention and preparedness stages (see Figure 4.2).

![Figure 4.2 Classic model of disaster risk reduction](image)

Disaster risk reduction (DRR) is the conceptual framework of elements whose purpose is to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development (UN, 2007).

The questions are: How do we promote modal sosial or gotong royong, which proved to be a key to the success of the reconstruction process, especially in providing shelter and housing after the disaster? How do we manage reconstruction efforts through the synergistic cooperation of the government, NGOs, individual donors, the private sector, and the community? Moreover, how do we use these experiences as educational resources for improving our preparedness for future disasters, especially earthquakes? Completing the other elements of the DRR Cycle, that is, prevention, mitigation, and preparedness is urgently needed. Some programs that look beyond the response and recovery stages have been developed, including disaster preparedness educational programs for children, programs by
villages and communities to promote gotong royong, and rural planning and development programs that focus on earthquake preparedness. The current situation of the Java Earthquake 2006 should be sustained to finish regions’ assignment in formulating and implementing and improving capacity towards those three components: prevention, mitigation, and preparedness.
CHAPTER 5: KEY MESSAGES

The post-disaster recovery phase of the Yogyakarta Earthquake provided a unique opportunity to correct past errors. The earthquake revealed the weaknesses of past development policies and strategies, which resulted in increased risks, and allowed those risks to be better understood. Limitations of institutional structures that allowed high-risk planning were identified. Furthermore, the Yogyakarta Earthquake generated new knowledge that brought together various stakeholders in understanding the nature of risks and the principle of “building back better.” These opportunities are among those documented in this report, a collaborative undertaking between Gadjah Mada University and the IRP not only to enhance recovery operations but also ensure that old vulnerabilities are not recreated.

This report has drawn key lessons from the Yogyakarta recovery experience by highlighting certain sectors as entry points for reducing risk through recovery. Programs and initiatives in the sectors of shelter, livelihood, governance, social affairs, infrastructure, and gender are considered critical to future progress and the development of concrete actions that will address current gaps in recovery practices.

Shelter

Housing reconstruction is central to disaster recovery. In the case of Yogyakarta, the early and sustained priority on housing resulted in a recovery process that has been largely successful. Survey results show that residents do not feel that they received enough money to build their ideal homes, but that they did find the funds to be very useful in helping them recover and return to normal life in the new post-earthquake environment.

The ‘roof first’ strategy adopted during the recovery process also included the widespread use of T-shirts (transitional shelters), which bridged the gap between emergency shelter and the reconstruction of permanent housing. The “roof first” strategy and T-shirts helped people return to their homes faster, and allowed them to be more involved in the recovery process.

As part of one of the largest community-driven housing reconstruction projects in the world, with the task of constructing over 250,000 houses, the shelter recovery operation allowed for community participation at three levels: the design process, material contributions for transitional shelters, and the construction process.

The three examples below all offer valuable lessons about the connected nature of buildings and their residents, especially of houses and their inhabitants. Within the framework of safe construction methods and building technologies, there are many different ways that recovery processes and projects facilitate relationships with and involve community residents.

The most direct case was the Community Empowerment Program (CEP), which taught residents to rebuild their own houses safely and provided training programs for construction workers. CEP relied on the local culture of strong social community organization for sharing and spreading information. These kinds of training activities, targeting both local residents and construction workers, are recommended for widespread use.

The reuse of recycled brick rubble as aggregate for cast-in-place concrete construction is an example of a “best practice” that closes the loop between debris management and reconstruction. This process has many advantages over conventional debris removal paired with traditional masonry construction: it is cheaper and faster, does not require a skilled bricklayer, does not require any finishing treatment or plaster, and of course has a huge positive environmental impact by transforming rubble into useable construction materials. This project should be replicated in similar rebuilding processes. Moreover, this way of thinking about the reuse of construction debris should be considered whenever possible.
In the dome housing recovery project, the building technology and format was created first, with residents only later adapting to and modifying their new houses to meet their needs. The residents of the new dome houses in New Ngelepen were able to adapt to their new homes successfully, but this does not mean that the non-native domes will be a good solution in any location. The dome housing project raises important concerns about international agencies that might be insensitive to or unaware of cultural appropriateness in the local context, or unreceptive to criticism or suggestions. The lesson learned from this project is that at a time when international involvement in local recovery is necessary and unavoidable, it is critical for international agencies to work closely with a local partner and to show respect for the local culture. In the case of New Ngelepen, the local university made a concerted effort to collaborate with and mediate between the international aid agency and the local community. This is a role that other universities can also play in their communities.

Livelihood

Livelihood approaches in post-disaster recovery put people and their priorities at the center of development efforts. Livelihood approaches should ensure that poverty reduction interventions focus on empowering the poor to build on their own opportunities, supporting their access to assets, and developing an enabling policy framework and institutional environment. It is important to have livelihood-focused intervention during the recovery phase and to ensure that knowledge is transferred in such a way as to enhance sustainable livelihood recovery.

The Yogyakarta post-earthquake recovery framework is anchored in community-based livelihood recovery. Concrete initiatives offer several lessons in addressing livelihood issues based on local wisdom. Holistic approaches to solving problems that existed before the earthquake have been essential in ensuring the “build back better” approach to livelihood. Direct advocacy and grassroots level work are among the practices that can facilitate the effective identification of community needs and challenges, and the exploration of solutions. The integration of livelihood intervention with building reconstruction and historical/cultural preservation could offer a means of ensuring that the knowledge of a society is preserved and that its vulnerability is reduced.

Livelihood recovery in Yogyakarta has also facilitated active collaboration and partnership among universities, local and international NGOs, local organizations, government agencies, and the private sector, thus serving as a model for a holistic approach to livelihood recovery. This model can be replicated in areas with similar conditions, further facilitating sustainable development.

Governance

The Yogyakarta earthquake offered several lessons related to governance issues to enhance post-disaster recovery operations. The need to implement regulations, institute coherent policies at all levels of government, and provide adequate operational guidelines are among the key lessons learned. The institutional framework at the time of the disaster did not work well because of issues ranging from ad-hoc policymaking, to the adoption of policies that did not follow the regular bureaucratic procedures. While these issues are now being addressed, it is important to be mindful of the problems they caused so that past mistakes are not replicated.

Sound practices were also drawn from the Yogyakarta recovery experience. First, the central government adopted a “one-step” policy in recovery, and relevant national and local government agencies were required to develop risk mitigation measures to ensure the success of that policy. Second, universities (e.g., UGM) initiated and actively supported government activities by mobilizing students to assist in assessing damage as well as volunteering in the provision of technical assistance to communities, particularly in housing reconstruction. Third, local NGOs (e.g., the Gaia Foundation) provided services in areas where the government had less expertise, such as community organization and community needs assessment. Finally, the local government of Bantul, one of the areas severely affected by the earthquake, promoted solidarity among citizens during the recovery process by facilitating regular gatherings among neighborhoods to discuss and resolve problems.
The Yogyakarta experience clearly illustrates that sound recovery operations are not facilitated by the government alone, but through collaborative efforts that include other actors, such as universities, local NGOs, and the community. The most important role of the government is to facilitate and strengthen the coordination of recovery efforts.

**Social Affairs**

The Yogyakarta situation articulately testifies to the fact that resilient recovery can be successfully achieved if recovery operations and activities are promoted by the local people themselves, using local wisdom and traditional social networks. The tradition of Gotongroyong (i.e., mutual help among neighbors within a community), is rooted in rural Javanese culture and considered as one of the key elements in facilitating the effective recovery efforts in Yogyakarta.

According to M. Baiquni, Gotongroyong was neglected and discarded in the process of modernization and capitalization from the 1970s to 1990s in Indonesia. However, the Central Java Earthquake reminded those affected about how helpful Gotongroyong could be in mobilizing manpower and resources, organizing volunteer activities, and enhancing a sense of unity and affinity within the community.

As indicated in the case studies, community-based approaches to housing reconstruction and livelihood recovery played a very important role in the recovery process. An in-depth analysis of the housing reconstruction program emphasized the significance of strong community leadership in organizing Gotongroyong. In many affected areas, strong community leadership was manifested in housing reconstruction in such a way that the amount of foreign aid accepted had to be reduced.

Musyawarah Mufakat refers to a series of reiterative and interactive discussions aimed at promoting mutual understanding and consensus building within a community, acknowledged as useful for alleviating competition and friction among neighbors and also facilitating the implementation of Gotongroyong. In the case of livelihood recovery, the expansion of the social network within and beyond the community has contributed to the earlier restoration of assets, capital, and materials.

Put simply, the Yogyakarta case clearly illustrates that social capital is one of the main drivers for efficiently and effectively achieving a resilient recovery and sustainable communities. It is also evident that social capital should be forged within and beyond the community in all social activities, even during non-emergency situations.

**Infrastructure**

The task of post-earthquake reconstruction is an opportunity to rebuild without the deficiencies of the old system. This opportunity has been seized by many governments in their efforts to "build back better." Governments and communities have rebuilt in a manner that removes prior vulnerabilities, leaving the communities stronger than they were before the earthquake.

The 2006 Yogyakarta Earthquake recovery process exemplifies the principle of “build back better” in the way the public infrastructure facilities, such as school buildings, were reconstructed. A number of key and innovative steps were taken. First, three independent agencies coordinated the reconstruction. The Indonesian Bank Association (PERBANAS) teamed up with UGM and a building contractor to ensure the quality of construction. UGM served as the design and supervisory consultant. The Architectural Engineering Faculty of UGM oversaw the design process, ensuring that the new buildings would be earthquake resistant. Payments were released to the contractor at different stages of completion – 33%, 70% and 100%. For funds to be released, the contractor had to obtain a quality assurance letter from the supervisory consultant. Only then would funds be released by the Indonesian Bank Association, which was funding the school building reconstruction. The involvement of three independent agencies facilitated adherence to construction norms and quality standards.
One particularly key decision was made before construction began: the government decided to take advantage of the reconstruction opportunity to improve the learning-teaching quality of its schools. This was achieved by adding two types of classrooms: a computer laboratory and a language laboratory.

The actors in the recovery process realized the importance of "building back better," not only in terms of enhancing the seismic resilience of the buildings but also of improving the quality of education in the rebuilt schools. This constitutes a “best practice” and is worthy of replication.

**Gender**

Gender shapes the disaster experience and the ability to recover. It explains why certain groups of people are at greater risk and why others recover at a slower pace. Gender mainstreaming is a key strategy for reducing inequalities between genders. Mainstreaming gender into disaster management strengthens the resilience of entire communities, cuts recovery time, and leads to more efficient recovery and reconstruction.

Issues of gender mainstreaming, the empowerment of women, and gender-conscious earthquake recovery should be highlighted in various initiatives that are carried out in earthquake-affected areas. Strong traditional ties, local wisdom, actions of local universities and local governments, as well as the overall societal structure in affected areas should be mindful of gender issues in recovery process.

The key messages along those sectors point the mobilization of social capital (i.e., encouraging citizens and various stakeholders to work together) have hastened the Yogyakarta recovery effort. In fact, the strength of the Yogyakarta recovery is manifested in livelihood activities that put people at the center of recovery efforts and development initiatives.

However, several gaps were also identified in the Yogyakarta recovery effort, and these should be addressed in the future. For instance, while Gotongroyong has been revived, little has been done to address traumatic stress and other issues related to the psycho-social problems caused by the disaster. In terms of infrastructure, while focus has been given to the reconstruction and rebuilding of schools, other lifeline buildings (e.g., hospitals and utilities) need further consideration in the future. In terms of governance, while community participation and public-private and CSO collaboration have been advocated, the capacities of local governments still need to be strengthened. In terms of shelter, while the reuse of recycled brick rubble could be considered a “sound practice,” the use of dome housing raises important concerns about international agencies, which may exhibit some cultural insensitivity.
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