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The 15th Meeting of
The Consultative Group on Indonesia
Jakarta, June 14, 2006

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Preliminary **Damage** and **Loss** Assessment

Yogyakarta and Central Java Natural Disaster

Second Printing

A joint report of BAPPENAS, the Provincial and Local Governments of D.I. Yogyakarta,
the Provincial and Local Governments of Central Java, and international partners, June 2006

MAGELANG (KOTA)
BOYOLALI
MAGELANG
PURWOREJO
SLEMAN
KLATEN
SUKOHARJO
YOGYAKARTA (KOTA)
KULON PROGO
BANTUL
GUNUNG KIDUL
WONOGIRI

The 15th Meeting of
The Consultative Group on Indonesia
Jakarta, June 14, 2006

Preliminary Damage and Loss Assessment

Yogyakarta and Central Java Natural Disaster

A Joint Report from BAPPENAS, the Provincial and Local Governments of
D.I.Yogyakarta, the Provincial and Local Governments of Central Java,
and international partners, June 2006

FOREWORD

The May 27, 2006 earthquake struck Yogyakarta and Central Java. Yogyakarta is a center for Javanese traditional arts and culture, the ancient temples of Borobudur and Prambanan, and is home to a royal family whose lineage goes back to the Mataram era in the 16th century. It is also a center of Indonesian higher education.

Striking in the early morning hours, the earthquake took over 5,700 lives, injured between 40,000 and 60,000 more, and robbed hundreds of thousands of their homes and livelihoods. As if the devastation of the earthquake were not enough, the disaster may not be over. The increase in Mount Merapi's volcanic activity, which began in March 2006, is producing lava flows, toxic gases, and clouds of ash, prompting the evacuation of tens of thousands of people.

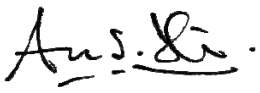
This report presents a preliminary assessment of the damage and losses caused by the earthquake. The assessment used the international standard methodology for measuring disasters, and draws upon some of the best experts in the world. The report provides the Government and the international community a clearer understanding of the impact of the disaster, and a basis for designing reconstruction and recovery programs. The report was prepared under the leadership of BAPPENAS, supported by a strong team of Indonesian and international specialists.

The analysis finds that the impact from this earthquake is much greater than initially believed. While major infrastructure remains largely intact, the damage and losses to housing and other buildings that were constructed without proper reinforcement (small enterprises, schools, clinics, etc) were staggering. The overall damage and loss of the earthquake, estimated at Rp 29.1 trillion (US$3.1 billion), places this as a more costly disaster than the tsunami impact on Sri Lanka in 2004, and similar in scale to the Gujarat earthquake of 2001 and the recent earthquake in Pakistan.

This most recent disaster provides a stark reminder of the high level of risk Indonesia faces from natural hazards. It is clear from this assessment that poor building techniques and low quality building materials contributed greatly to the large number of people killed and the high level of damage. Rehabilitation, reconstruction and future development plans will need to take this into consideration and integrate proactive, preventative measures into the rehabilitation and reconstruction program and in the development strategy more broadly. In Indonesia, sadly, there is no escaping the fact that there will be a "next time", and it may come sooner rather than later.

As in Aceh and Nias, the Yogyakarta and Central Java disaster also provides another example of the resilience of the Indonesian people to carry on and rebuild their lives. Now that the immediate relief operations are running well, the Government has announced its plans to move immediately to a reconstruction program, whereby resources would be provided directly to the affected communities, who would drive the process. This program deserves the full support of the national and international community. This report is intended to help inform that process.

H. Paskah Suzetta
State Minister for National Development Planning Agency / Chairman of BAPPENAS



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The BAPPENAS-team was led by Luky Eko Wuryanto and Suprayoga Hadi, and included the following sector coordinators: Nural Wajah (housing and infrastructure), Choesni (productive activities), Taufik Hanafi (social sectors), Togu Pardede (cross-cutting sectors), and Sumedi (impact analysis). Significant contributions were also made by Agus Prabowo, Arifin Rudiyanto, Arum Atmawikarta, Basah Hernowo, Deddy Koespramudyo, Donny Azdan, Gumilang Hardjakusuma, Ikhwanuddin Mawardi, Sidqy Suyitno, Subandi, Syahrial Loetan, Taufik Hanafi, Tubagus Achmad Choesni, Umiyatun Hayati Triastuti, Wahyuningsih Darajati, and Yohandarwati. The BAPPENAS-team was supported by technical assistants from BAPPENAS directorates, especially Amil Alhumami, Anom Parikesit, Benny Azwir, Destri H., Edy Darmono, Eka Chandra Buana, Erik Armundito, Hayu Parasati, Hermani Wahab, Hermani Wahab, Inti Wikanestri, Jadhie Aradajat, Jayadi, Dading Gunadi, Khairul, Subarja, Kuswiyanto, May Hendarmini, Nurul Wajah Mujahid, Petrus Sumarsono, Pungkas B. Ali, Rachmi Utami, Rahmi Utamisari, Rohmad Supriyadi, Rohmad, Rudi Hartono Pakpahan, Rudi Pakpahan, Setio Utomo, Somantha Prakosa, Sumedi Andono Mulyo, Suryansyah Bachta, Suryansyah Bachta, Sutiman, Taufiq Hidayat Putro, Togu Pardede, Vivi Andriani, Yukie, and Yunus Gustanto, From the Provincial BAPPEDAs, support was led by Bayudono, Anung Hermantoro, Edi Siswanto, Tavip and Budi Setyana.

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GLOSSARY

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
BAKORNAS	The National Disaster Management Agency (Badan Koordinasi National)
BAPEDALDA	District Environment Impact Management Agency (Badan Pengendalian Dampak Lingkungan Daerah)
BAPPEDA	Regional Body for Planning and Development (Badan Perencanaan Pembangunan Daerah)
BAPPENAS	National Development Planning Board (Badan Perencanaan Pembangunan Nasional)
BI	Bank Indonesia
BP3	Center for Heritage Conservation (Balai Pelestarian Peninggalan Purbakala)
BPD	Regional Development Bank (Bank Pembangunan Daerah)
BPM	Community Development Agency
BPR	Rural Credit Bank (Bank Pembangunan Rural)
BPS	National Statistics Bureau (Badan Pusat Statistik)
BTN	State-Owned Housing Bank (Bank Tabungan Negara)
CGI	Consultative Group for Indonesia
CSO	Civil Society Organization
DAU	General Allocation Grant (Dana Alokasi Umum)
DfID	UK Department for International Development
Dinas	Provincial or District Government Office
DPK	Cleansing and Parks Agency (Dinas Kebersihan dan Pertamanan)
EC	European Commission
ECLAC	Economic Commission for Latin America and the Caribbean
EU	European Union
FAO	Food and Agriculture Organization
FIRM	Financial Intermediation and Resource Mobilization
FY	Financial Year
GDP	Gross Domestic Product
GIS	Geographic Information System
GOI	Government of Indonesia
GRDP	Gross Regional Domestic Product
GTZ	German Cooperation Agency (Gesellschaft fuer Technische Zusammenarbeit)
HDI	Human Development Index
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
KAI	State-Owned Railway Company (PT Kereta Api Indonesia)
MoNE	Ministry of National Education
MoRA	Ministry of Religious Affairs
MPW	Ministry of Public Works
NBFI	Non-Bank Financial Institution
NGO	Non-Governmental Organization
NPL	Non-Performing Loan
P3B	Load Control Center (Penyaluran dan Pusat Pengatur Bantuan)
PDAM	Regional Government-Owned Water Enterprises (Perusahaan Daerah Air Minum)
PLN	The National Electricity Company (Perusahaan Listrik Negara)
Polindes	Village Maternity Post (Pondok Bersalin Desa)

POSKO	Coordination Post (Pos Koordinasi)
PUSKESMAS	Health Center at Sub-District Level (Pusat Kesehatan Masyarakat)
Rp	Indonesian Rupiah
SATKORLAK	Provincial Disaster Response Agency (Satuan Koordinasi Pelaksana)
SD	Primary School (Sekolah Desa)
SME	Small & Medium Enterprises
TELKOM	State-Owned Telecommunications Company
TNI	Indonesian Military (Tentara Nasional Indonesia)
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
WHO	World Health Organization
WWF	World Wildlife Fund

EXECUTIVE SUMMARY

On May 27, an earthquake struck the very heartland of Indonesia, near the historic city of Yogyakarta. With its epicenter in the Indian Ocean at about 33 kilometers south of Bantul district, it measured 5.9 on the Richter Scale and lasted for 52 seconds. Because the earthquake was relatively shallow at 33 kilometers under ground, shaking on the surface was more intense than deeper earthquakes of the same magnitude, resulting in major devastation, in particular in the districts of Bantul in Yogyakarta Province and Klaten in Central Java Province.

The earthquake was the third major disaster to hit Indonesia within the past 18 months. In December 2004, a major earthquake followed by a tsunami devastated large parts of Aceh and the island of Nias in North Sumatra, and in March 2005, another major earthquake hit the island of Nias again. With Indonesia's more than 18,000 islands along the Pacific "ring of fire" of active volcanoes and tectonic faults, the recent disaster is a reminder of the natural perils facing this country.

Damage and Losses

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. A comprehensive analysis by a team of Indonesian Government and international experts estimate the total amount of damage and losses caused by the earthquake at Rp 29.1 trillion, or US$ 3.1 billion. Total damage and losses are significantly higher than those caused by the tsunami in Sri Lanka, India and Thailand and are similar in scale to the earthquakes in Gujarat (2001) and in Pakistan (2005) (see Table 1).

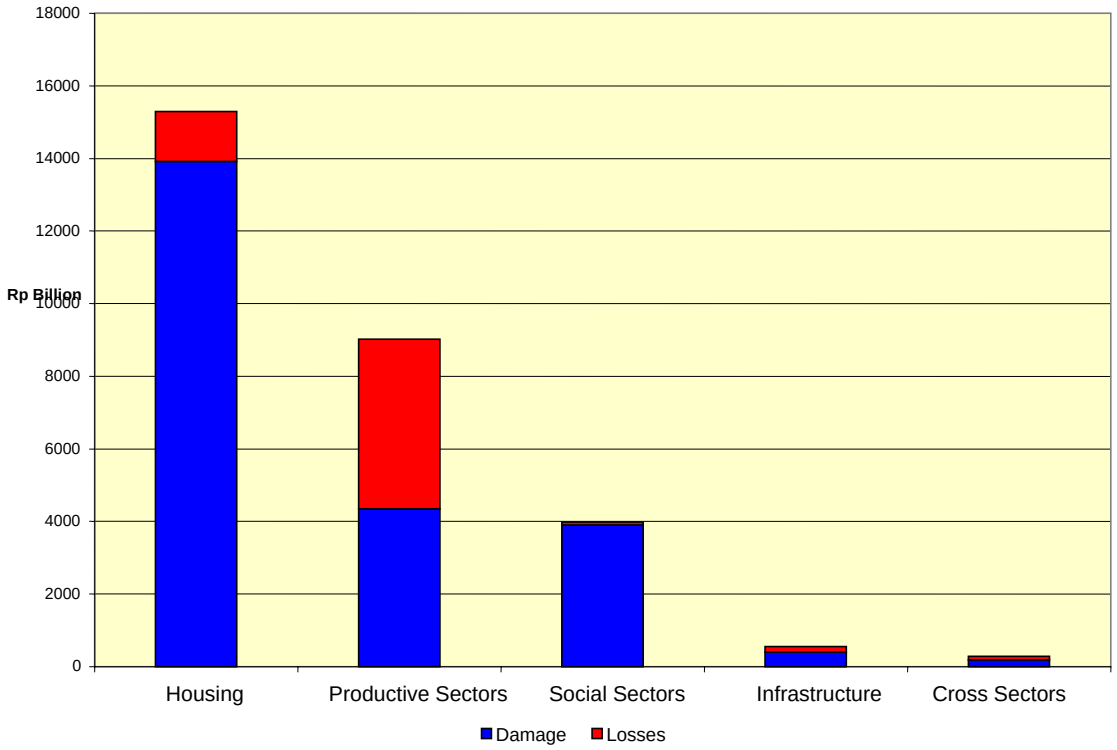
Table 1: International Comparison of Disasters

Country	Disaster event	Date	Number killed	Damage & losses (US$ million)	Damage & losses (US$ million, 2006 constant prices)
Turkey	Earthquake	Aug.17, 1999	17,127	8,500	10,281
Indonesia (Aceh)	***Tsunami***	***Dec. 26, 2004***	***165,708***	***4,450***	***4,747***
Honduras	Hurricane Mitch	Oct.25–Nov.8,1998	14,600	3,800	4,698
Indonesia (Yogya-Central Java)	***Earthquake***	***May 27, 2006***	***5,716***	***3,134***	***3,134***
India (Gujarat)	Earthquake	Jan. 26, 2001	20,005	2,600	2,958
Pakistan	Earthquake	Oct. 8, 2005	73,338	2,851	2,942
Thailand	Tsunami	Dec.26, 2004	8,345	2,198	2,345
Sri Lanka	Tsunami	Dec.26, 2004	35,399	1,454	1,551
India	Tsunami	Dec. 26, 2004	16,389	1,224	1,306

Sources: Asia Disaster Preparedness Center, Thailand; ECLAC, EM-DAT, World Bank

The damage was very heavily concentrated on housing and private sector buildings. Private homes were the hardest hit, accounting for more than half of the total damage and losses (Rp 15.3 trillion). Private sector buildings and productive assets also suffered heavy damage (estimated at Rp 9 trillion) and are expected to lose significant future revenues. This will have a particularly serious impact on small and medium sized enterprises, as the area was a key center of Indonesia's burgeoning small scale handicrafts industry. Damage to the social sectors, particularly health and education, are estimated at Rp 4 trillion. All other sectors, particularly infrastructure, had comparably smaller damage and losses (see figure 1), far below the infrastructure damage caused by the tsunami in Aceh and Nias.

Figure 1: Summary of Damage and Losses



Source: Estimates of Joint Assessment Team

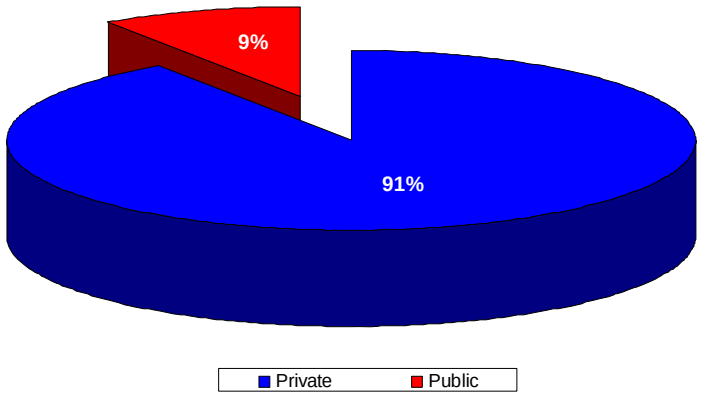
Key Sectoral Facts and Issues:

- **Housing damage and losses account for over 50% of the total**. An estimated 154,000 houses were completely destroyed and 260,000 houses suffered some damage. More houses will have to be replaced and repaired than in Aceh and Nias at a total cost of about 15% higher than the damage and loss estimate of the tsunami.
- **Over 650,000 workers were employed in sectors affected by the earthquake, with close to 90% of damage and losses concentrated in small and medium enterprises**. 30,000 enterprises were directly affected as well as through supply chain and other disruptions in intermediation. Unemployment is likely to rise. The restoration of livelihoods will be an urgent priority.

- **Social sectors also experienced significant damage**. Health and education were equally hard hit with more than Rp 1.5 trillion in damage and losses. Private sector health facilities (predominantly uninsured) suffered greater losses than the public sector.
- **Most of rural and urban infrastructure remained intact and suffered only small damages**. Transport and communications, energy and water supply and sanitation damage and losses are estimated at Rp 551 billion. At this level of damage, it is expected that infrastructure can be restored to its pre-disaster levels relatively quickly through existing Government agencies.

The damage and losses are predominantly private (see figure 2). This is a result of the high concentration of damage to private housing and small scale industry. This makes the earthquake in Yogyakarta and Central Java unique in comparison with other disasters and has important implications for the strategy of rebuilding and compensation.

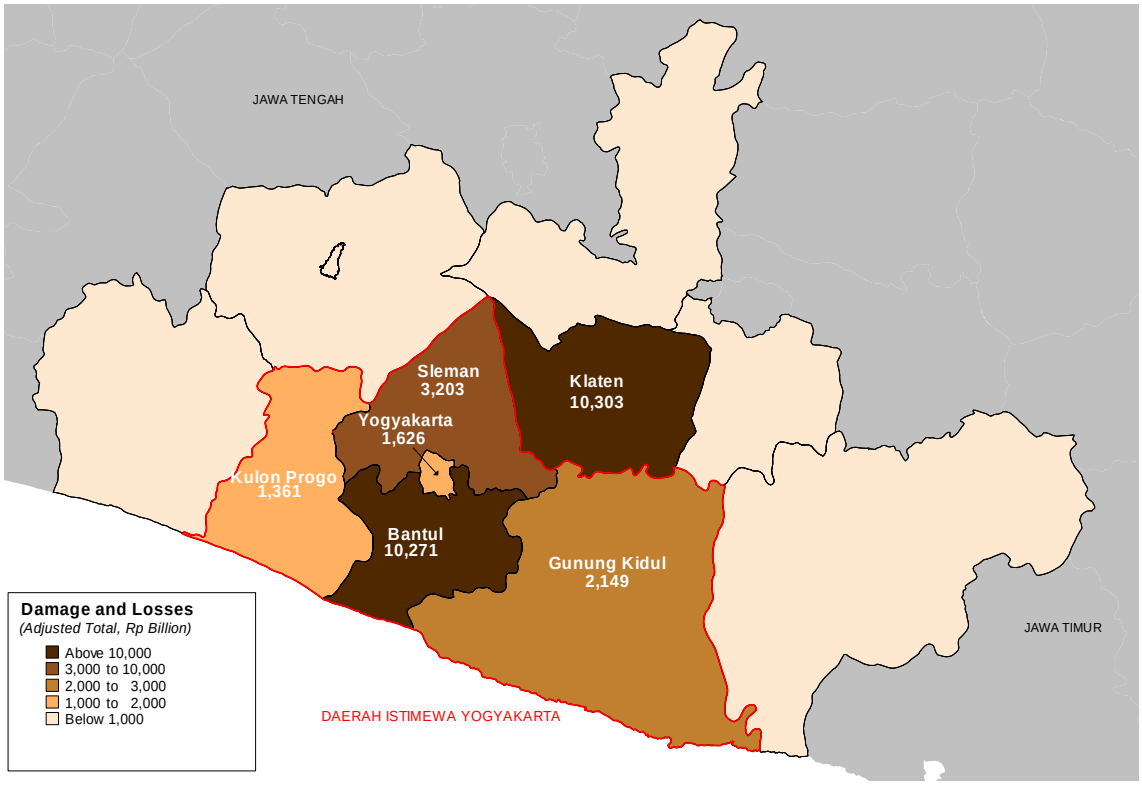
Figure 2: Composition of Damage and Losses: 91 % private



Source: Estimates of Joint Assessment Team

The impact of the disaster was highly concentrated in the districts of Bantul in Yogyakarta Province and Klaten in Central Java. Together Bantul and Klaten constitute more than 70% of the total damage and losses. The other major damaged areas include the City of Yogyakarta and three other rural districts in the province of Yogyakarta (see map 1). Klaten experienced the most severe aggregate damage, particularly in housing; Bantul suffered heavily from productive sector damage and losses, as well as housing damage.

Map 1: Geographic Distribution of Damage and Losses



Source: Estimates of Joint Assessment Team

Why are damage and losses so high?

The earthquake hit in Java, one of the most densely populated areas in the world. The six districts most affected by the earthquake have a population of about 4.5 million. The districts of Bantul and Klaten – with an average population density of over 1,600 – rank among the top ten most densely populated districts in Indonesia.

The shallowness of the epicenter contributed to widespread structural damage. An earthquake of similar magnitude, but deeper in the ground would have resulted in much less shaking on the surface and hence less damage to buildings.

The scale of the natural disaster was compounded by man-made failures to build earthquake resistant structures. Large-scale damage to buildings is associated with a lack of adherence to safe building standards and basic earthquake resistant construction methods. Most of the private homes used low-quality building materials and lacked essential structural frames and reinforcing pillars and collapsed easily as a result of lateral shaking movements. The poor are the least able to afford building safe houses and many of their homes were damaged. Many public buildings also collapsed due to poor building standards, in particular schools, many of which were built in the 1970s and 1980s with special government grant funds. Clearly, there was minimal enforcement of building codes.

Given the prevalence of home-based industries, the economic losses caused by destroyed or damaged homes were particularly large. Large numbers of furniture, ceramics and handicraft makers saw their livelihoods destroyed together with their homes. The destruction of private uninsured assets adds substantially to the loss estimates.

Given the large-scale destruction, it is fortunate that not more people died. That the earthquake hit on a Saturday morning around 6 a.m., when most people were already awake and busy with morning chores outside their houses, stemmed the already considerable death toll. Had the earthquake occurred during school or work hours, the number of fatalities would surely have been much larger. However, the number of injuries is estimated at 40,000 to 50,000 as many houses with substandard construction collapsed on their inhabitants.

The Impact

Poverty – already above the national average in this area – will be exacerbated by the earthquake. Nearly 880,000 poor people live in the affected areas. It is estimated that an additional 66,000 might fall into poverty and 130,000 might lose their jobs as a result of the earthquake. The impact on job losses is especially severe in services and small scale manufacturing. Preliminary estimates suggest that the region's gross domestic product might fall by 5%, with an economic contraction as high as 18% in the worst hit districts.

Transitional housing and services will be concentrated largely on existing home sites. A snap survey found that 74% of the households with houses completely destroyed were living in tents on their existing plots. In these circumstances, it is critical to ensure a quick recovery of basic water and sanitation in the affected areas. Some villages report that the quality and taste of the water has declined even though the water supply is intact. Women and girls have consistently raised the need for underwear, sanitary napkins and cooking equipment.

The psychological trauma of this disaster should not be underestimated. Qualitative reports indicate that trauma levels are high in severely affected areas. The stress is significantly compounded by the threat of an eruption at the Mount Merapi volcano. While people are quickly mobilizing to ensure adequate temporary accommodation, it may take some time before households are ready to engage in planning activities.

Key Issues in Going Forward

Although damage and losses are very large, the nature of the damage differs substantially from Aceh and Nias. With most of the large-scale infrastructure intact and only modest losses to local governments on the ground, the challenge of reconstruction is less daunting when compared with Aceh and Nias. A masterplan to cover all the integrated aspects of reconstruction is not required. The sequencing of reconstruction is far less of a challenge either. Those sectors that suffered relatively minor damage and losses can easily be handled through existing central and local institutions covered by the national and local budget.

The single, most consequential decision to make is how to ensure that the newly built and repaired houses adhere to proper building standards to ensure that such losses are never repeated again. Many of the private houses and public buildings would not have withstood an earthquake of an even lower magnitude. The scale of this damage can be prevented in future. However, his will require a large-scale program of housing reconstruction that facilitates new earthquake resistant homes. Experience in Aceh suggests that this can be accomplished. The highly concentrated impact of this disaster coupled with limited infrastructure damage, and strong local communities and local governments suggests that it can be done more quickly than in Aceh and Nias.

The emerging lessons of Aceh and Nias confirm the value of taking a community-driven approach to reconstruction. People are passionate about their homes. They have strong and often very diverse preferences. And they need to be closely involved in the choices that affect their most important asset. People engaged in rebuilding their homes are also taking responsibility for rebuilding their lives – a key part of the healing process. Their passion and intense personal interest in rebuilding their homes is also the most powerful tool to utilize for effective monitoring of the flow of funds to prevent corruption and malfeasance. For these reasons, the community-driven approach has consistently demonstrated important advantages and should be the model for going forward in Yogyakarta and Central Java.

Speed is critical in planning and implementing a rehabilitation and reconstruction plan. Homeowners are already, or will soon start reconstructing their homes, and if these homes are built to the same standard as their previous homes, they will again be vulnerable to a future disaster. Similarly, many of the SMEs that were affected will need short-term assistance to get back on their feet. Rapid loans and/or other types of financial assistance to help them rebuild structures, equipment, and replenish stocks will enable them to rapidly begin generating incomes again.

Given the magnitude of the funds required and the high portion that will flow in grants to households, a strong monitoring and evaluation framework is essential. Large-scale reconstruction often suffers from a lack of timely information about progress and an evaluation of existing programs. This assessment provides a large amount of baseline data against which the reconstruction progress can be monitored.

This new tragedy, coming so closely on the heels of the tsunami, reiterates the need for comprehensive disaster preparedness and risk management. The Yogyakarta earthquake cannot be analyzed as an isolated event. In fact, the value of its effects must be taken into consideration with the ones that Indonesia sustained in the Province of Aceh as a result of the 26 December 2004 Indian Ocean Earthquake and Tsunami. The combined effects of the two disasters are of significant magnitude for the Indonesian Government to seriously consider entering into disaster risk management practices, with special reference to financial risk transfer schemes, if it wishes to reduce the impact of future events.

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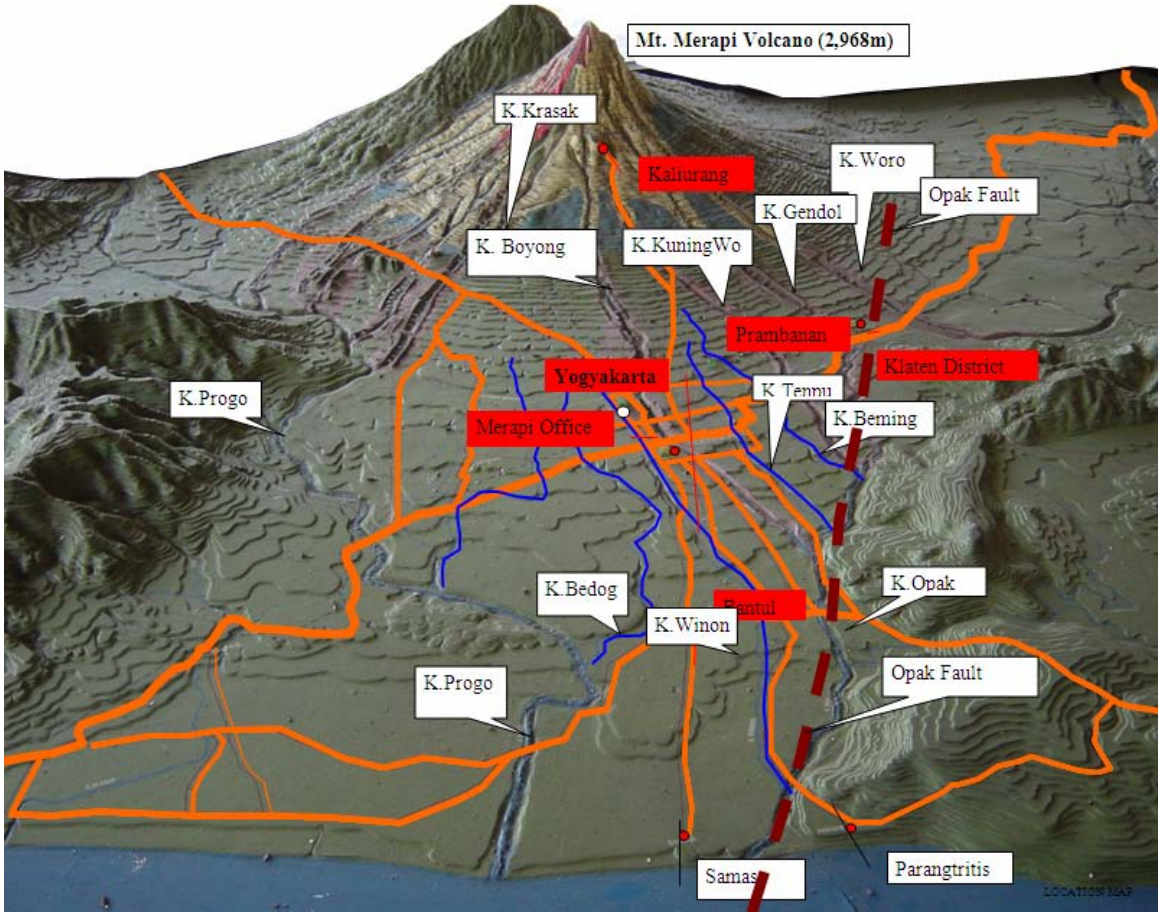
Section I.
The Disaster

THE MAY 27, 2006 EARTHQUAKE



Source: Japan Bank for International Cooperation (JBIC)

The earthquake struck Java island on May 27, 2006 at 5:53 AM local time, and measured 5.9 on the Richter scale.[1] The epicenter was in the Indian Ocean about 33 kilometers south of Bantul district in Yogyakarta Province. The tremors lasted for 52 seconds. More than 750 aftershocks have subsequently been reported, with the strongest intensity measuring 5.2 on the Richter scale. The earthquake occurred at shallow depth in the Sunda plate above the subduction zone of the Australian plate. The tectonics of Java are dominated by the Australian plate's northeastward movement beneath the Sunda plate with a relative velocity of about 6 cm/year.[2]

The earthquake directly affected the provinces of Yogyakarta and Central Java. In Yogyakarta, the event affected all five districts - Bantul, Gunung Kidul, Kulon Progo,

[1] Indonesian Meteorological and Geophysical Agency. The United States Geological Survey recorded even 6.3 on the Richter scale.

[2] United States Geological Survey, http://earthquake.usgs.gov/eqcenter/recenteqsww/Quakes/usneb6.php#summary

Sleman and Yogyakarta City. To the West and North of Yogyakarta, six districts of Central Java province were affected – Boyolali, Klaten, Magelang, Purworejo, Sukoharjo and Wonogiri. The two most severely affected districts are Bantul in Yogyakarta Province and Klaten in Central Java Province.

THE HUMAN TOLL

The earthquake killed more than 5,700 people, injured tens of thousands and made hundreds of thousands homeless. As it struck in the early morning hours, the earthquake trapped many people in their homes. Based on latest available information, the earthquake has taken over 5,700 human lives. Injury estimates range from 37,000 to 50,000, and hundreds of thousands have been rendered homeless (see table 2).

Table 2: Death Toll and Number of Injured of the Yogyakarta-Central Java Earthquake

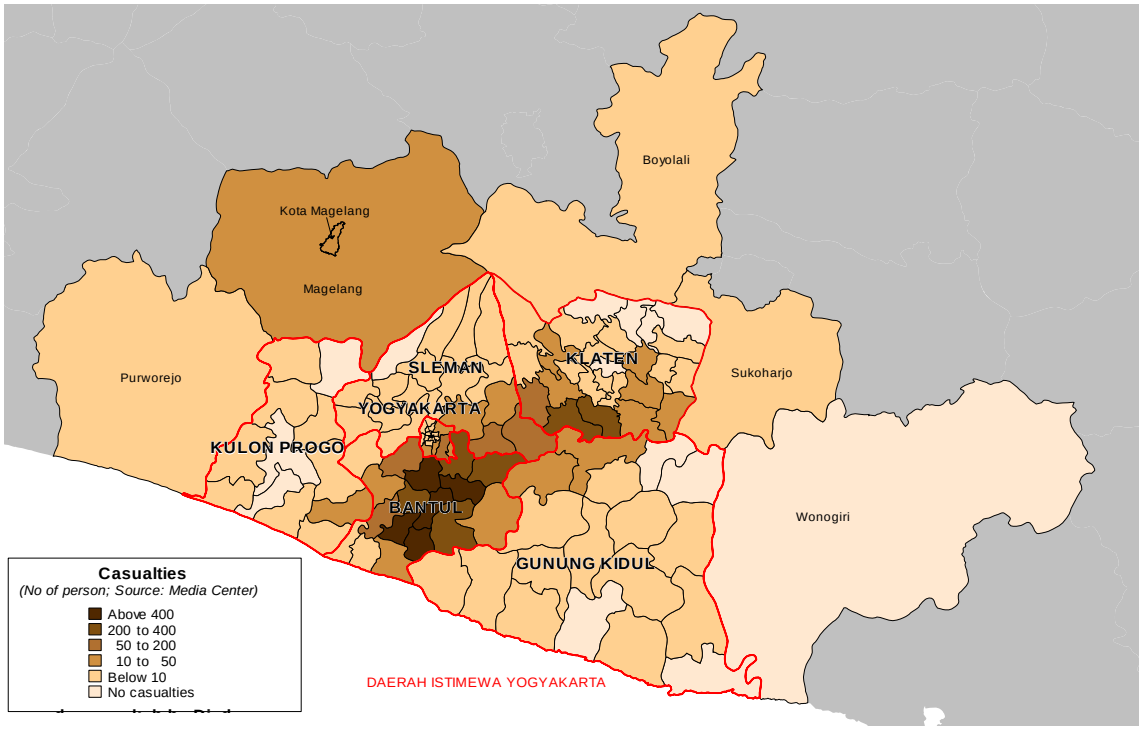
Province and District	Death Toll	Number Injured
Yogyakarta Province	4,659	19,401
Bantul	4,121	12,026
Sleman	240	3,792
Yogyakarta City	195	318
Kulon Progo	22	2,179
Gunung Kidul	81	1,086
Central Java Province	1,057	18,526
Klaten	1,041	18,127
Magelang	10	24
Boyolali	4	300
Sukoharjo	1	67
Wonogiri	-	4
Purworejo	1	4
Total	5,716	37,927

Source: Yogyakarta Media Center, June 7, 2006

The simultaneous eruption of nearby Mount Merapi has added to the complexity of the humanitarian response and earthquake recovery efforts. Fourteen days before the earthquake, the Ministry of Energy and Mineral Resources' Center of Volcanology and Geological Hazard Mitigation raised the alert level for Merapi to level 4, indicating that a major eruption is imminent. Since the earthquake, small eruptions have produced avalanches of hot gas and volcanic material, with the lava dome at the center gaining mass. On June 8, multiple pyroclastic flows reached a distance of 4 km to the Krasak and Boyong Rivers and reached a maximum distance of 4.5 km from the head of the Gendol River. The activity level of Merapi remains at level 4 due to risk of pyroclastic flows, and tens of thousands of people have been evacuated. While the occurrence of shallow-focus earthquakes near volcanoes is

not unusual, it is not clear from available data whether there is a direct link between the earthquake and the ongoing eruption of Mount Merapi.[3]

Map 2: Geographic Distribution of Earthquake Casualties



Source: Based on June 7, 2006 Figures

THE RESPONSE

The Government's Response

The Indonesian Government responded within hours and has allocated Rp 5 trillion to the relief effort. 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 National Disaster Management Agency (BAKORNAS), led by Vice President Jusuf Kalla, has 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. The Government of Indonesia initially

[3] United States Geological Survey, http://earthquake.usgs.gov/eqcenter/eqinthenews/2006/usneb6/#summary.

allocated Rp 1 trillion from the national budget for relief and reconstruction activities. Of this amount, BAKORNAS has been provided with an initial Rp 75 billion for emergency response efforts. Response teams, medical teams and military units from around the country have been deployed to the affected provinces. The total budget to be made available has since increased to Rp 5 trillion.

District authorities are distributing emergency compensation payments and in-kind support that the central Government made available. These include, among others, 10 kilograms of rice per person per month, 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. In addition to this, the Government announced that over 820,000 people whose homes have been severely damaged will be provided with full living expenses for three months, and those whose houses have sustained minor damage will receive a one-month allowance. Families also receive Rp 2 million for each family member who perished, and the Vice President has announced that Rp 30 million will be provided for each destroyed house, and Rp 10 million for damaged houses. Medical expenses for injuries related to the earthquake are to be covered by the Government at public facilities.

The International Response

The international community has been swift in its response, helped by the fact that many organizations are still involved in Aceh. Many agencies had also set up stockpiles for the possible eruption of Mount Merapi weeks before the earthquake. The International Federation of the Red Cross and Red Crescent, various United Nations agencies, and at least 35 international NGOs have mobilized essential emergency relief supplies, besides medical and other disaster management personnel. The UN has established a main coordination center at Yogyakarta and a liaison office in Klaten. A United Nations Disaster Assessment and Coordination team was deployed on May 30, 2006 to support operations in Bantul and Yogyakarta.

HIGH DISASTER RISK IN INDONESIA

Indonesia is one of the world's most disaster-prone countries. **Located at the conjunction of three tectonic plates, it has a very high exposure to seismic activity.** With close to 200 volcanoes, out of which more than 70 are categorized as "very active", the country has the highest number of active volcanoes in the world. Further, Indonesia regularly experiences landslides, flooding and earthquakes. Flooding presents the largest risk when weighted by the proportion of GDP and mortality. Wildfires are also a considerable risk, as demonstrated in the 1998 wildfires that occurred during the El Niño event. Figures 3 and 4 below present the geographic distribution of risk in Indonesia to six major hazards (cyclones, drought, earthquakes, flooding, landslides and volcanoes). Vulnerability to these disasters was estimated from hazard-specific mortality and economic loss rates for World Bank regions and country wealth classes, calculated from 20 years of historical loss data. The figures illustrate that for Indonesia - Java, which is in the top decile for mortality risk for all hazards - faces the highest risk in terms of casualties due to a natural disaster, while both Sumatra and Java face the highest risk of economic losses due to a natural disaster.

Figure 3: Disaster Risk Hotspots for Indonesia: Mortality risk

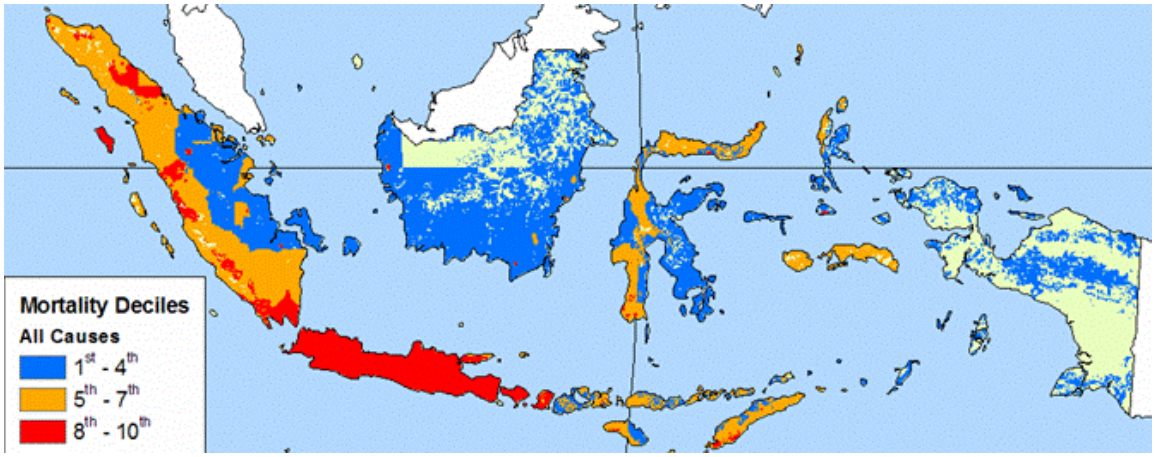
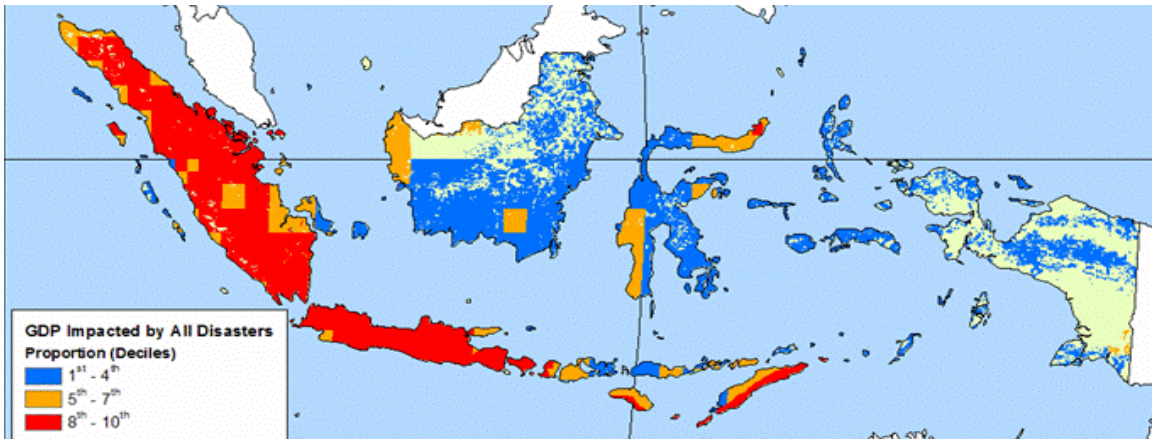


Figure 4: Disaster Risk Hotspots for Indonesia: GDP



Source: M. Dilley et al., The World Bank and Columbia University, 2005

SOCIAL AND ECONOMIC BACKGROUND

The May 27 earthquake hit 11 districts, home to more than 8.3 million people. Six districts are heavily affected including five in the province of Yogyakarta (Bantul, Sleman, Gunung Kidul, Yogyakarta, Kulon Progo) and Klaten in Central Java. With 4.5 million inhabitants, these six districts are very densely populated.

Most of the people in the affected areas are poor, but not extremely so. With the exception of the City of Yogyakarta and the District of Sleman, annual income levels are about Rp 5 million or half of the national average. The poverty rates in all other affected areas are also above the national average but to a lesser extent. The combination of low income and medium poverty levels points to a very equal distribution of income. Most of the people in the affected areas share very similar characteristics and living conditions.

Geography and Population

The area affected by the earthquake is geographically small but densely populated. Its total population is around 4.5 million (2% of the national population) concentrated in an area equivalent to 0.2% of the national territory.

Bantul and Klaten, the most heavily affected districts, share very similar characteristics in terms of population and density. Both districts have populations of around one million and a population density among the ten highest in the country (approx. 1,600 inhabitants per km^2). Yogyakarta and Central Java rank second and forth respectively in the nation (table 3), whereas density in the urban district Yogyakarta ranks third among all urban districts (approx. 12,000 inhabitants per km^2).

Table 3: Demographic Summary by Province and District

	Population (1000s)	% in Province	% in Indonesia	Area km2: *National district mean 4,564*	Density per km2 (rank 1=highest)*	
Yogyakarta Province	**3,224**	**100**	**1.5**	**3,133**	**1,047**	**(2)****
Sleman	945	29	0.5	575	1,644	(9)
Bantul	819	25	0.4	508	1,611	(10)
Gunung Kidul	687	21	0.3	1,431	480	(82)
Yogyakarta City	396	13	0.2	33	12,192	(3)
Kulon Progo	376	12	0.2	586	641	(66)
Central Java Province	**32,543**	**100**	**15.5**	**32,800**	**1,003**	**(4)****
Klaten	1,131	3.0	0.5	656	1,724	(7)
Magelang	1,158	0.4	0.1	1,086	1,067	(25)
Boyolali	131	2.9	0.5	1,015	921	(34)
Sukoharjo	838	2.6	0.4	467	1,768	(5)
Wonogiri	1,011	3.1	0.5	1,793	562	(72)
Purworejo	712	2.2	0.3	1,034	687	(58)
Indonesia	**209,000**	**100**	**100**	**1,981,122**	**107**	

*Source: Data BPS Data Dan Informasi Keminiskan (2004), Computations by Joint Assessment team, * Rank from 86 urban districts for Kota Yogyakarta and 348 for rural districts. ** Rank across 30 provinces*

Economic and Fiscal Framework

Per capita income in the six most heavily affected districts is Rp 6.1 million, or about 60% of the national average (Rp 10.5 million). Nominal GRDP for the Yogyakarta province was Rp 21.8 trillion (approx. US$ 2.3 billion) in 2004, accounting for 1% of national GDP (Table 4). In Central Java, GRDP stood at Rp 193.4 trillion (approx. US$ 20.5 billion) representing 8.8% of total GDP. Gross regional product per capita in the Yogyakarta province is around Rp 6.7 million whereas in Central Java it is Rp 5.9 million. Figure A4 in the technical annex illustrates the trend and relative size of GRDP per district for the period 2000 to 2004.

Table 4: GDP and GDP Per Capita (Rp 2004)

	GDP current 1/			GDP per capita 1/		
	Rp billion	% in Province	% in Indonesia	Rp million	% in Province	% in Indonesia
Yogyakarta Province	21,849	100	1.0	6.7	100	65
Bantul	4,171	19	0.2	5.1	76	49
Gunung Kidul	3,378	15	0.1	4.9	73	47
Kulon Progo	1,836	8	0.1	4.9	73	47
Sleman	6,640	30	0.3	7.0	104	67
Yogyakarta City	5,876	27	0.3	14.8	221	141
Central Java Province	193,438	100	8.8	5.9	76	43
Klaten	5,125	3	0.2	4.5	76	43
Magelang	4,148	2	0.2	3.5	59	33
Boyolali	4,247	2	0.2	4.5	76	43
Sukoharjo	4,420	2	0.2	5.3	90	50
Wonogiri	3,166	2	0.1	3.1	53	30
Purworejo	2,951	2	0.1	4.1	69	39
All other districts in Central Java	169,381	87	7.8	5.6	106	53
Indonesia	2,273,142	100	100.0	10.5	270	100

Source: GDRP data reported by BPS, computations by Joint Assessment Team 1/ In Central Java province

In Yogyakarta services and trade jointly made up 39% of regional GDP in 2004, while agriculture amounted to 16.6% (Table 5). There were, however, significant differences in production concentration across districts in the province. Yogyakarta City, a high-density urban center, had almost no agricultural production (0.5%) while services, trade, restaurants and hotels, transportation, and communication accounted for 64% of its GRDP. On the contrary, agricultural production makes up for a large share of GRDP in the districts of Gunung Kidul (36%), Kulon Progo (25%), and Bantul (23%)[4].

[4] See Table A.1 in the technical annex for nominal distribution per sector, Table A.2 for each sector's relative size, and Figure A.1 for stacked distribution of GRDP sectors.

Table 5: Yogyakarta's Economic Structure in 2004

	Yogyakarta		Indonesia	
	Rp billion	Share %	Rp billion	Share %
Agriculture	3,637	16.6	331,553	14.6
Mining and Quarrying	183	0.8	196,112	8.6
Manufacturing	3,219	14.7	639,655	28.1
Electricity, Gas & Water Supply	268	1.2	22,067	1.0
Construction	1,744	8.0	143,052	6.3
Trade, Restaurant & Hotel	4,171	19.1	369,361	16.2
Transportation & Communication	2,137	9.8	142,292	6.3
Financial Services	2,199	10.1	194,429	8.6
Services	4,290	19.6	234,620	10.3
GDP (without Oil & Gas)	21,849	100.0	2,072,052	91.2
GDP Total	21,849	100.0	2,273,142	100.0

Source: GDRP data reported by BPS, computations by Joint Assessment Team

The affected areas generate very little own revenues, and like other poor districts in Indonesia, depend heavily on the central Government's general allocation transfer (DAU).[5] In Bantul and Klaten own revenue sources represent less than 6% of total revenues. Shared non-tax revenues (from natural resources) are for the most part negligible in all districts (less than 0.1% of total revenues) and tax-shared revenue represents less than 4% of total revenues for most of the districts affected (except Yogyakarta City and Sleman).

Table 6: Revenue Composition for Affected Districts in Yogyakarta and Central Java Provinces, Spending Realization FY 2004 (Rp Billion)

	Own Revenue sources	%	Non-tax shared revenue (Nat. Resources)	%	Tax shared revenue	%	General allocation Transfer (DAU)	%	Total
Yogyakarta Province									
Kulon Progo	20	5.3	0.4	0.1	12	3.3	344	91	**377**
Gunung Kidul	20	4.2	0.4	0.1	15	3.1	433	93	**467**
Sleman	60	10	0.4	0.1	37	6.3	485	83	**583**
Bantul	31	5.9	0.4	0.1	19	3.7	471	90	**521**
Yogyakarta city	80	18	0.4	0.1	38	8.7	317	73	**435**
Central Java Province									
Klaten	27	3.9	0.6	0.1	24	3.5	635	93	**687**
Magelang	44	7.7	0.6	0.1	21	3.7	503	89	**568**
Boyolali	37	6.8	0.6	0.1	18	3.3	492	90	**548**
Sukoharjo	22	4.6	0.6	0.1	24	5.0	421	90	**467**
Wonogiri	25	4.5	0.6	0.1	19	3.3	523	92	**568**
Purworejo	26	7.7	0.7	0.1	20	3.7	432	89	**479**
Total	391	--	5.7	--	246	--	5,057	--	**5,701**

Source: Data Reported by MOF, Computations by Joint Assessment Team

[5] For example, the DAU transfer accounts for as much as 93% of total revenue in the district of Gunung Kidul (table 6).

Poverty

As many as 880,000 poor people live in the earthquake affected areas. Two out of five districts in Yogyakarta (accounting for 33% of the province's population) are significantly poor relative to districts in the rest of the country.[6] Klaten, Gunung Kidul and Kulon Progo districts are the poorest with a poverty rate of around 25% (falling on the third decile relative to other districts in the country) but the share of poor is lower in the districts of Bantul, Sleman, and Yogyakarta City. At the province level, the percentage of the poor in Yogyakarta is around 19%, falling on the fifth decile relative to other provinces in Indonesia. The percentage of the poor in the province of Central Java however, is slightly higher than Yogyakarta.

Table 7: Poverty Indicators in Yogyakarta and Central Java (2004)

	Population (thousands)	Poor Population (thousands)	Poor %	Decile National (1 poorest)
Yogyakarta Province	3,224	616	19.1	5
Bantul	819	152	18.5	5
Gunung Kidul	687	173	25.2	3
Kulon Progo	376	95	25.1	3
Sleman	945	147	15.5	6
Yogyakarta City	396	50	12.7	7
Central Java Province	32,543	6,844	21.0	4
Klaten	1,132	264	23.3	3
Magelang	132	186	16.0	9
Boyolali	942	172	18.4	9
Sukoharjo	838	118	14.3	8
Wonogiri	1,011	246	24.4	9
Purworejo	712	167	23.5	8
All Provinces in Java	120,000	20,200	16.8	--
Indonesia	209,000	35,900	17.2	--

Source: Computed based on SUSENAS 2004.

[6] Table 7 reports the share of poor population in each of Yogyakarta's districts and the decile to which they fall relative to the overall national.

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Section II.
Estimation of Damages and Losses

Summary of Damage and Losses

The total damage and losses caused by the earthquake[7] are estimated at Rp 29.1 trillion (US$ 3.1 billion). Total damages are estimated at Rp 22.75 trillion (78% of the total) and total economic losses stand at Rp 6.40 trillion (22%). Damages are a proxy for the amount of financing, including contributions by those affected, that will be needed for reconstruction. Losses represent the reductions in economic activity and in personal and family income that will arise in the following months as a result of the disaster (See table 8).

Table 8: Summary of Damage and Losses (Rp billion)

	Disaster Effects			Ownership	
	Damage	**Losses**	**Total**	**Private**	**Public**
Housing	**13,915**	**1,382**	**15,296**	**15,296**	**0**
Infrastructure	**397**	**154**	**551**	**76**	**476**
Transport and Communications	90	0	90	0	90
Energy	225	150	375	0	375
Water and Sanitation	82	4	86	76	10
Social Sectors	**3,906**	**77**	**3,982**	**2,112**	**1,870**
Education	1683	56	1739	584	1154
Health and Social Protection	1569	21	1590	1030	560
Culture and Religion	654	0	654	498	156
Productive Sectors	**4,348**	**4,676**	**9,025**	**8,854**	**170**
Agriculture	66	640	705	700	5
Trade	184	120	303	138	165
Industry	4063	3899	7962	7962	0
Tourism	36	18	54	54	0
Cross-Sectoral	**185**	**110**	**295**	**48**	**247**
Government	137	0	137	0	137
Banking and Finance	48	0	48	48	0
Environment	0	110	110	0	110
Total	***22,751***	***6,398***	***29,149***	***26,386***	***2,763***
Total, million US$	***2,446***	***688***	***3,134***	***2,837***	***297***

Source: Estimates by Joint Assessment Team

[7] Estimates were made using information obtained through June 7, 2006.

The sectoral distribution of the disaster's impact has been atypical, since infrastructure damage and losses were very limited. Instead, effects were concentrated in the housing, social, and productive sectors. Damage and losses in housing amounted to Rp 15.3 trillion (52% of the total). Productive sectors lost Rp 9 trillion (31%), and social sectors, mainly education and health, had damages of Rp 4 trillion (14%). The disaster had a significant social impact because it affected living conditions and revenues of workers in small and medium enterprises.

Households and private companies were most strongly impacted by the disaster. Total private sector damage and losses are estimated at Rp 26.4 trillion (90% of the total), while public sector damage and losses are Rp 2.8 trillion (10%). However, the contribution of public resources to reconstruction will be significant, since few poor households or small businesses had insurance coverage.

Box 1: Measuring Damage and Losses – The ECLAC-Methodology

To assess damage and losses, the joint team including BAPPENAS, provincial and local authorities, and international partners used the methodology designed by the UN Economic Commission for Latin America and the Caribbean (ECLAC). The ECLAC methodology was first developed in the early 1970's and has been modified and strengthened over more than three decades of application in post-disaster contexts around the world.

The methodology produces a preliminary assessment of the impact on physical assets that will have to be repaired or replaced, as well as of flows that that will not be produced until the asset is repaired or rebuilt.

The assessment analyzes three main aspects:

- **Damage** (direct impact) refers to the impact on assets, stock, and property, valued at agreed replacement (not reconstruction) unit prices. The assessment should consider the level of damage (whether an asset can be rehabilitated/repaired, or has been completely destroyed).
- **Losses** (indirect impact) refer to flows that will be affected, such as reduced incomes, increased expenditures, etc. over the time period until the assets are recovered. These will be quantified at present value. The definition of the time period is critical. If the recovery takes longer than expected, as in the case of Aceh, losses might increase significantly.
- **Economic effects** (sometimes called secondary impacts) include fiscal impacts, implications for GDP growth, etc. This analysis can also be applied at sub-national level.

The damage was concentrated in a few districts; Klaten in Central Java and Bantul in Yogyakarta Province were the most affected. They sustained damage and losses of over Rp 10 trillion each (some 70% of the total). Other districts sustained damage and losses on a much lower scale (See table 9). The true magnitude of the disaster, however, can be determined by comparing the amount of damage and losses to the size of the economy,

which is the international measure of disaster magnitude. Bantul was the most affected district with 246% total damage and losses compared to its gross domestic product. Klaten has a ratio of 201%. The districts of Kulon Progo and Gunung Kidul also have relatively high ratios ranging between 50% and 75%.

Table 9: Geographical Distribution of Disaster Effects

Province and District	Population, thousands	Gross Domestic Product, Rp billion	Total Effects, Rp billion	Disaster Magnitude, %	Per capita Impact Rp million
Yogyakarta Province	3,224	21,849	18,742	86	5.8
Bantul	819	4,171	10,335	246	12.6
Yogyakarta City	396	5,876	1,639	28	4.1
Kulon Progo	376	1,836	1,372	74	3.6
Gunung Kidul	687	3,378	2,167	64	3.2
Sleman	945	6,640	3,229	48	3.4
Central Java Province	32,542	193,438	10,387	201	9.2
Klaten (incl. other affected districts)	1,131	5,125	10,387	201	9.2

Source: Estimates by Joint Assessment Team

Average per capita damage and losses were also uneven. Bantul was the most affected by far with a per capita effect of Rp 12.3 million. The impact on Klaten was also significant with Rp 6.5 million. Other severely affected districts fall within a similar range, with per capita effects of Rp 3-4 million (see table 9).

Housing

Summary

Rebuilding and rehabilitating homes will be central in the Yogyakarta-Central Java reconstruction effort. Housing damage and losses are Rp 15.3 trillion, or more than half of the total figure. An estimated 157,000 houses were destroyed and 202,000 more were damaged. Between 600,000 and a million people have been left homeless. The scale of housing destruction is larger than in Aceh, mainly due to the high population density in the area affected by the earthquake and poor quality construction standards of many structures. A staggering 4.1 million combined cubic meters of debris lie at the site of all of these collapsed houses. However, rebuilding should be easier and faster than in Aceh because most of the infrastructure remains intact. The removal of debris and provision of tents for the displaced people is the immediate challenge in coming weeks.

Pre-disaster Conditions

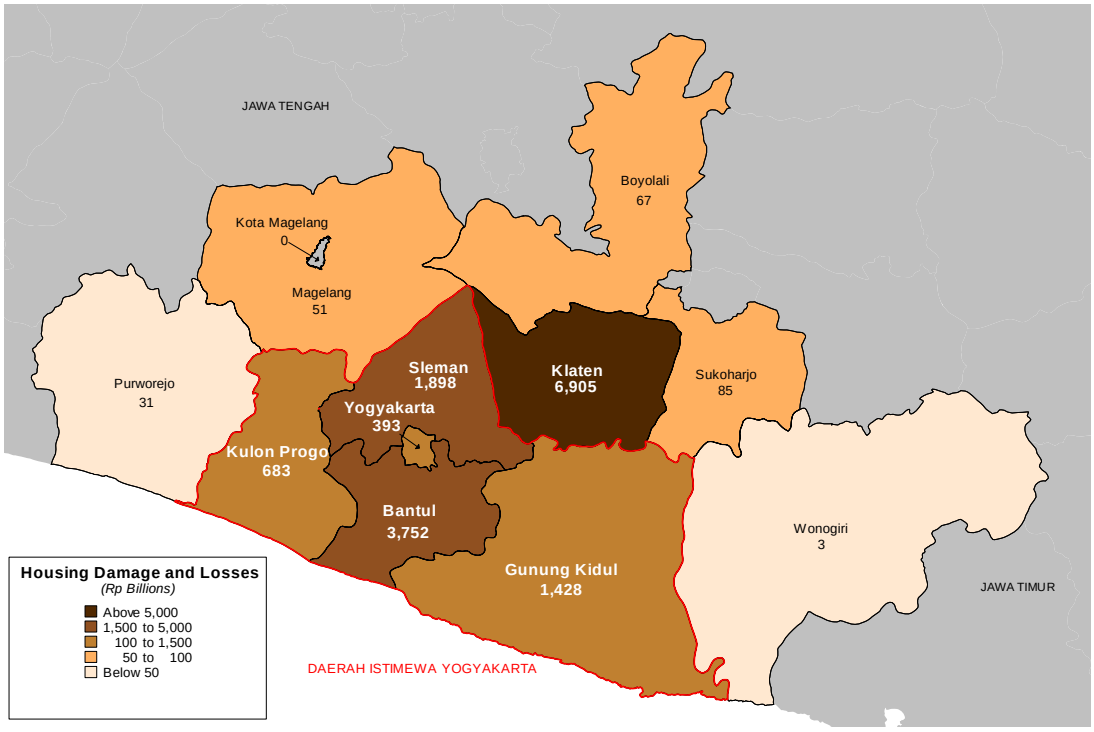
Before the disaster, Yogyakarta province and the six affected districts in Central Java had a total stock of private houses of 2.1 million, more than twice the total housing stock in Aceh. The housing stock in the six most affected districts was 984,000. The district of Klaten had the largest number of houses by far (280,500); Sleman came second (197,000); and Bantul third (182,000).

Damage and Loss Assessment

The housing sector suffered the most severe damage and losses of any sector from the May 27 earthquake. Most of the damage occurred in the districts of Bantul and Klaten (see figure 1). Most of the affected houses were between 15-25 years old. Less than 3% were houses of traditional design. Nearly 7.4% of the total housing stock was completely destroyed (about 157,000 units) and 9.5% (about 202,000 units) suffered some damage. These figures jump to 15.6% and 20.2% respectively in the six most affected districts.

Bantul in Yogyakarta province and Klaten in Central Java province were the worst hit districts. The districts of Bantul and Klaten (map 3) comprised 72% of the total housing stock destroyed, and 95% of total fatalities and serious injuries occurred in these districts. Gunung Kidul, Sleman, and Yogyakarta were seriously affected, whereas the outlaying areas of Magelang, Purworejo, and Wonogiri suffered only minor housing damages. Klaten had the largest number of houses destroyed (66,000) followed by Bantul (47,000).

Map 3: Geographic Distribution of Total Housing Damage and Losses (Rp billion)



Source: Joint Assessment Team based on housing damage and losses

The houses fell down because we simply don't have the financial resources to build decent houses. We never expected an earthquake in our lifetime." (An elderly resident in Bantul)

Houses made of wood or bamboo rather than brick/concrete were more resistant to the earthquake's tremors. While traditional bamboo houses did seem to better withstand the shock, this was not true for those with heavy tile roofs on alluvial soils that didn't have an adequate roof support structure.

For the most part, people have been able to make temporary living arrangements on the site of their destroyed homes, using tents, tarps, and salvaged materials. A snap survey found that 74% of households whose houses were completely destroyed were living inside a tent in front of their house. This allows communities to stay together rather than being scattered in temporary shelter sites. It also allows residents to protect their property and belongings in familiar surroundings. In many cases, residents have already begun to salvage valuables as well as building materials, which can be reused for the reconstruction of their houses. Tarpaulins are also being used to protect remaining household assets from the elements. Because tarpaulins are lacking, some organizations have found as many as four or five families living together under a single tarpaulin.

The primary cause of damage was the lack of anti-seismic features in many houses. A rapid assessment of affected housing must be carried out urgently with inputs from seismic engineers, to establish the main sources of problems (inadequate building codes, improper sitting, or monitoring and enforcement of standards). Moreover, it is vital to

disseminate basic information on safe building immediately, as people are not waiting around to rebuild their homes and risk rebuilding to the same level of vulnerability.

Damage assessments for housing began shortly after the earthquake through the Public Works Department, in coordination with BAPPENAS and other national and local agencies. The process was bottom-up: residents provided information on the level of damage to the village head, which was then reviewed by Satkorlak and various line ministries. The team for this report conducted a number of field visits to verify the data. The figures presented in this report use the data provided by the Yogyakarta Earthquake Media Center as of June 6, 2006, with an adjustment of 10% to reflect findings of the field visits.

Table 10: Overall Physical Damage (Housing Units)[8]

	Totally destroyed	Damaged	Total	Private	Public
Yogyakarta Province	88,249	98,342	186,591	186,591	0
Bantul	46,753	33,137	79,889	79,889	
Sleman	14,801	34,231	49,031	49,031	
Gunung Kidul	15,071	17,967	33,038	33,038	
Yogyakarta City	4,831	3,591	8,422	8,422	
Kulon Progo	6,793	9,417	16,210	16,210	
Central Java Province	68,414	103,689	172,103	172,103	0
Klaten	65,849	100,817	166,666	166,666	
Sukoharjo	1,185	488	1,673	1,673	
Magelang	499	729	1,228	1,228	
Purworejo	144	760	904	904	
Boyolali	715	825	1,540	1,540	
Wonogiri	23	70	93	93	
Total	156,662	202,031	358,693	358,693	0

Source: Estimates of Joint Assessment Team

[8] The Joint Assessment Team adjusted the initial categories: 70% of the "heavily damaged" houses were reclassified as destroyed. The remaining 30% were reclassified as simply "damaged". See Annex tables for details of all assumptions, adjustments and data sources.

"I wish I could build back better but I know I cannot. We self-finance our houses and have no savings. To build back better is completely out of the question although I know the risks. Would you like to give me some money now so I can build better as you tell me to do so?" (A village head in Klaten)

The four rural districts of Bantul, Klaten, Sleman and Gunung Kidul suffered over 91% of the total housing destruction. The province of Yogyakarta and Klaten district make up 98% of the total number of houses destroyed and almost all damages were recorded there (figure 1). Important disaggregated data by gender, household head, age, household size, vulnerable groups, income level or land tenure were not yet available. However data is being collected and should inform reconstruction and recovery strategies and projects.

Table 11: Summary of Damage and Losses in Housing (Rp billion)

	Damage	Losses	Total	Private	Public
Yogyakarta Province	7,421	733	8,154	8,154	0
Bantul	3,419	333	3,752	3,752	
Sleman	1,724	175	1,898	1,898	
Gunung Kidul	1,299	129	1,428	1,428	
Yogyakarta City	358	35	393	393	
Kulon Progo	621	62	683	683	
Central Java Province	6,494	649	7,143	7,143	0
Klaten	6,278	627	6,905	6,905	
Sukoharjo	77	7.4	85	85	
Magelang	47	4.6	51	51	
Purworejo	28	3.0	31	31	
Boyolali	61	6.0	67	67	
Wonogiri	3.1	0.3	3.4	3.4	
Total for Housing Sector	13,915	1,382	15,296	15,296	0
% of Total Damage and Loss of All Sectors	61	22	53	58	0

Source: Estimates of Joint Assessment Team

The scale of housing destruction is higher than that caused by the December 2004 earthquake and tsunami in Aceh (figure 2). Damage and losses in the housing sector (Rp 15.3 trillion) form the largest share of the total. They are higher than the total damage and losses caused by the Aceh disaster (Rp 13.4 trillion - table 3). While the affected area is smaller than that touched by the Aceh tsunami, the scale of damage is larger. This is mainly because Yogyakarta and Central Java have some of the highest population densities in Indonesia, such that many more people were affected. The districts of Bantul and Klaten have more than 1600 persons per square km, which is more than 50% above the Java average. Aceh in comparison has a very low population density of 72 persons per square km.

Table 12: Aceh versus Yogyakarta/Central Java – Housing Stock, Damage and Costs

Category		Aceh		Yogyakarta - Central Java (11 affected districts)		Yogyakarta - Central Java (6 most affected districts)	
Houses prior to Disaster		832,208		2,117,375		984,058	
Houses Destroyed	% Destroyed	127,325	15.3	156,662	7.4	154,098	15.7
Houses Damaged	% Damaged	151,653	18.2	202,031	9.5	199,160	20.2
Total Damage & Loss		Rp 13.4 trillion		Rp 15.3 trillion		Rp 15.1 trillion	
Average New House Reconstruction Cost		Rp 1.4 ~ 1.6 million/m²		Rp 1.0 ~ 1.2 million/m²		Rp 1.0 ~ 1.2 million/m²	

Source: Estimates of Joint Assessment Team

Preliminary Recommendations

- Identify hazardous buildings and structures which risk collapsing to avoid further fatalities and injuries. Many people continue to seek temporary relief in such structures unawares of the risks.
- Involve the affected communities in the reconstruction program. The victims must be encouraged to spend more for quality to avoid similar death tolls in the future.
- The housing standards and compensation for the beneficiaries will need to be as homogenous as possible across all strata of society to avoid fuelling tensions between and among districts and villages.
- Facilitating adequate supplies of sustainable building materials through the supply chain will be critical to ensure that victims can get new houses in the shortest time frame possible to start rebuilding their livelihoods.

Infrastructure

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 is energy with damage to the electricity transmission and distribution facilities estimated at a total Rp 225 billion and losses at a further Rp 150 billion from physical damage.

In the transport sector, there was widespread but minor damage to roads, and localized damage to Yogyakarta's airport, and to mainline railway tracks and associated infrastructure. Total damage is estimated at Rp 90.2 billion. Most of the road damage (80%) occurred on provincial and district roads and two-thirds of the damage is located in the districts of Sleman and Bantul.

Total damage and losses in the water supply and sanitation sector are estimated to be Rp 85.6 billion, mostly due to damage to the 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. Total estimated damage should not exceed Rp 7 billion.

Table 13: Summary of Infrastructure Damage and Losses

Sector / Sub-Sector	Effect (Rp Billion)			Ownership	
	Damages	Losses	Total	Public	Private
Water & Sanitation	81.9	3.7	85.6	10.1	75.5
PDAM Water Supply	5.0	3.7	8.7	8.7	0.0
Rural Water Supply	75.5	0.0	75.5	0.0	75.5
Urban Sanitation	1.4	0.0	1.4	1.4	0.0
Energy	225.0	150	375.0	375.0	0.0
Transmission Substations	135.0	150	285.0	285.0	0.0
Distribution Network	90.0	0.0	90.0	90	0.0
Transport and Communications	90.6	0.2	90.8	90.8	0.0
Roads	45	0.0	45.0	45.0	0.0
Railway	19.9	0.0	19.9	19.9	0.0
Civil Aviation	18.9	0.2	18.9	18.9	0.0
Post and Telecoms	7.0	0.0	7.0	7.0	0.0
Total	397.5	153.8	551.4	475.9	75.5
% of Total Damage and Losses	1.7	2.4	1.9		

Source: Estimates of Joint Assessment Team

WATER AND SANITATION

Summary

Total damage and losses in the water supply and sanitation sector are estimated to be Rp 85.6 billion, which is rather limited compared with other sectors. Most of the damage appears to be to 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 cleaning and rehabilitation costs of wells may amount to Rp 75.5 billion. At this stage, limited information is available on sanitation infrastructure below the ground level.

Pre-disaster Conditions

Urban water supply in the earthquake affected area is provided by regional government-owned water supply enterprises (Perusahaan Daerah Air Minum, PDAM), and, except in the greater Yogyakarta area, sanitation services are provided by the local government administration through the cleansing and parks agency (DPK). In the greater Yogyakarta area consisting of Yogyakarta city and parts of the Bantul and Sleman districts, the sewerage system is jointly managed and operated by the provincial government and local governments of Yogyakarta City and the districts of Bantul and Sleman. As in most of Indonesia, PDAM coverage is limited, leaving the majority of urban households and virtually all rural households to rely on self-provision through shallow groundwater abstraction, rainwater collection, or use of surface water from nearby rivers and springs. 85-95% of the villages in Bantul district in Yogyakarta province and Klaten district use wells as their source of water[9]. Individual wells and toilets inside houses are the norm, and open defecation into nearby rivers continues to be a widespread practice in rural areas.

Prior to the earthquake, only about 35 percent of Yogyakarta City's population (including parts of Bantul and Sleman districts) had access to a piped water supply system provided by PDAM Yogyakarta. PDAM Yogyakarta relies on water sources from ground water (shallow and deep wells), rivers and springs, with a total capacity of 583 liters/second (l/s). The service area is divided into four zones, with 34,560 household connections and unaccounted-for water at 31.2% before the disaster. Yogyakarta City is the only affected urban area with a limited sewerage system (30% coverage), with an under-utilized (40%) wastewater treatment plant in Sewon. Individual toilet facilities and on-site sanitation/septic tanks are predominant throughout the city. With regard to solid waste management, the Greater Yogyakarta area operates a regional landfill site located in Piyungan. Solid waste collection, city cleaning and street sweeping are carried out by the respective district governments.

In Bantul district, the water supply consisted of 12 units, one for Bantul town and 11 for subdistrict area systems in the region. Only about 10% of the total district population is served by PDAM Bantul, with the other 82% relying on shallow wells (93%), springs (5%), hand pumps (1%), rain water harvesting (0.4%), and other means of supply. The total

[9] PODES 2005 data collected by National Statistics Agency (BPS)

production capacity stood at 235 l/s, and unaccounted-for water was reported at 22%. A sanitation system did not exist, and only about 13% of the daily solid waste production was collected by the district garbage collection system.

In Klaten district water supply coverage prior to the earthquake was 56% for the town and 14% for the district overall. The PDAM covered the city of Klaten, and six subdistrict systems are spread throughout the district, with four of them relying on deep wells and two on springs. The piped system serves 22,537 house connections, of which about 13,000 are in the Klaten city area. Dug wells are commonly used as sources of water for households.

Damage and Loss Assessment

Overall, water supply and sanitation damage and losses appear to be relatively small and of temporary nature. Damage to water supply and sanitation facilities is summarized in Table 14. 90% of the water supply damage was in rural areas.

Table 14: Summary of Damage and Losses in Water and Sanitation

	Effects (Rp million)			Ownership	
	Damage	**Loss**	**Total**	**Private**	**Public**
Water and Sanitation	81.9	3.7	85.6	75.5	10.1
Water Supply	80.5	3.7	84.2	75.5	8.7
PDAM Water Supply	5.0	3.7	8.7	0.0	0.0
Production Unit (well, pump)	1.8	0.0	0.0	0.0	0.0
Pipe Network and Connections	3.2	0.0	0.0	0.0	0.0
Tanker Trucks	0.0	0.0	0.0	0.0	0.0
Lost Revenue	0.0	2.5	0.0	0.0	0.0
Additional Operating Cost	0.0	1.2	0.0	0.0	0.0
Rural Water Supply	75.5	0.0	75.5	75.5	0.0
Dug Wells Requiring Cleaning	33.5	0.0	0.0	33.5	0.0
Dug Wells Requiring Rehabilitation	41.9	0.0	0.0	0.0	0.0
Sanitation	1.4	0.0	1.4	0.0	1.4
Water Treatment Plant	1.4	0.0	0.0	0.0	0.0

Source: Estimates of Joint Assessment Team

Supply of piped water in the urban areas was disrupted for a few days mainly due to electricity outages, as about 90% of water is sourced from deep wells by pumping. In Yogyakarta, none of PDAM's buildings, pumps and wells were significantly damaged by the earthquake, and quick repair work was undertaken to maintain water supply. However, the water distribution network damaged by an increase in physical leaks throughout the city, in particular in the most affected subdistricts of Umbulharjo, Mergangsan, Kota Gede and Mantri Jero. Temporary repair at over 200 leak points is ongoing. No report is available on damage to sewer lines. While minor damage has been reported at the wastewater treatment plant, the plant is still operating. 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 are reportedly damaged, and two transmission pipe bridges have collapsed. In Klaten, only about 50 household connections were disrupted. Both being predominantly semi-urban and rural districts with very few piped connections, there was little damage to such connections. Conversely, given their higher prevalence, damage to individual wells and toilets has been sustained. However, it appears that even where levels of housing destruction are very high, while many wells have been filled with debris they remain structurally sound. Thus, immediate cleaning costs may be substantial, but replacement and reconstruction costs should be limited. As an interim measure, households in heavily damaged areas have reverted to communal use of water and sanitation facilities of neighbors where these have been cleared of debris, and PDAMs are providing water through tankers and public taps at evacuation camps.

Information on septic tank damage is not yet available 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 staff, where the houses of around 80% of PDAM staff have either collapsed or been badly damaged.

ENERGY

Summary

The earthquake caused significant damage to the Pedan (Klaten district) extra high voltage substation, minor damage to eleven high voltage substations, and widespread damage to medium- and low-voltage distribution networks and household connections. Supply of power to urban Yogyakarta was cut only briefly, and good progress has been made since in reconnecting the customers in rural areas whose buildings are 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 are estimated at Rp 325 billion and Rp 150 billion, respectively.

Pre-disaster Conditions

The public power supply in Java and elsewhere is managed by state-owned PT Perusahaan Listrik Negara (PLN). The affected region is normally supplied by power imported through the 500KV grid from the Paiton coal-fueled plants in East Java, and PLN has no significant generation capacity within the affected area. [10] PLN's Java-Bali Load Control Center (P3B) manages the 500KV backbone transmission grid and the regional 150KV transmission network. The Central Java Distribution business unit manages the distribution network and electricity sales to medium- and low-voltage customers in all affected areas.

The recently constructed Pedan substation, which is a crucially important node in the Java-Bali 500KV backbone grid, is located on the southern 500KV line which, when completed, will connect from Paiton via Kediri, Pedan, and Tasikmalaya, to Depok (Jakarta). There is also a 500KV connection from Pedan to Unggaran (Semarang) on the northern 500KV line.

Damage and Loss Assessment

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. This disabled both the Pedan-Kediri-Paiton and Pedan-Unggaran 500KV links, requiring power to be imported through the 150KV network from oil burning plants near Semarang (Tambak Lorok) and from West Java. The substation building also suffered minor cracking but control equipment inside was not affected. In addition, eleven 150KV substations in Yogyakarta province suffered minor damage to buildings and

[10] PLN has one small 260kW hydro unit in the area. There is no report of damage to this. A number of businesses have their own captive 'plants' providing main or standby power. There are reportedly around 140 units in Central Java province/ Yogyakarta province with a total installed capacity of circa 87MW. These form part of the productive sectors.

equipment.[11] No transmission towers were damaged. Total cost of repair works is estimated at Rp 135 billion[12] by PLN.

The Pedan-Unggaran 500KV link was re-energized on 31 May, enabling power from Tambok Lorok to be imported at 500KV. The Pedan-Kediri 500KV link was re-energized on 6 June, enabling resumption of supply from the Paiton coal-fueled plants.[13] Remaining work at Pedan and the 11 150KV stations, is expected to be completed by June 30.

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 880km of medium voltage (30KV and 20KV) distribution lines and 820km of low-voltage distribution lines. Only short sections of network suffered heavy damage. Initially, some 1,800 distribution transformers were not functioning and it is now estimated that around 180 are damaged. PLN expects to have the entire system properly functioning by the end of June, although final connectivity will be largely dependent on the pace of the reconstruction of damaged houses. The total costs of distribution network and building repair work are estimated by PLN at Rp 90 billion.

PLN's generation costs were greatly increased by the need to supply power to the region from oil-fueled rather than coal-fueled stations during the period from May 27 to June 6. Oil fuel consumption is estimated to have increased by 3,000 kiloliters per day, resulting in incremental daily generation costs of Rp 15 billion.[14] Total losses over the 10-day period when the Pedan-Kediri link was inoperable are estimated at Rp 150 billion by PLN.

The Central Java distribution business has reported that it anticipated reduced power sales over the coming six months.[15] No provision is made for such losses because: (a) the majority of customers affected are on the highly subsidized R1 tariff, which covers little more than short-term avoidable costs of supply and (b) most small residential customers use power during the evening peak period (between 5pm and 10pm) when PLN is struggling to meet demand.[16]

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[11] Bantul, Wirobrajan, Medari, Godean, Gejayan, Kentungan, Semanu, Solo Baru, Wates, Purwoajo, and Klaten.

[12] Updated information has been obtained from PLN subsequent to preparation of the main tables to which this text refers. Pedan damage is now estimated at Rp 92 billion. The PLN estimates were not independently verified before the equipment was repaired.

[13] This timetable is only possible because P3B is able to 'borrow' equipment for Pedan from the Grati substation, which is currently under construction.

[14] Figures should be validated by load flow data and energy costs.

[15] PLN is currently considering whether to bill those customers whose buildings have been totally destroyed for their May consumption.

[16] PLN is seeking to suppress peak period demand by imposing high peak period tariffs for large industrial and business customers (the only ones with time-based metering). In late 2005, it also introduced what is intended to be a temporary disincentive policy (Dayamax) on business and industrial customers to further suppress peak period consumption. Nonetheless, PLN has been forced to shed load on a number of occasions.

TRANSPORT AND COMMUNICATIONS

Summary

The earthquake caused comparatively minor damages to the public road network, railway infrastructure, Yogyakarta's airport, and to telephone installations and post offices. There are no sea ports or river terminals in the affected area.

ROADS

Pre-disaster Conditions

The road network is classified by administrative responsibility into national, provincial, district and city links. These classifications broadly reflect road function. At the center, responsibility for road infrastructure is vested in the Ministry of Public Works (MPW) and handled by the Directorate General of Highways. MPW is directly responsible for the development and maintenance of the national network and for setting policies and standards for the management of sub-national networks. The provincial and district public works agencies are responsible for the development and maintenance of their respective networks.

The national network in Yogyakarta province has total length of 169km (2004) and comprises the Yogyakarta ring road plus four radial links. The lengths of the provincial, district and city networks are 690km (2006), 3,834km (2000) and 210km (2000), respectively. In addition, there are 2,000km of village roads. Equivalent data for Klaten district was not readily available.

Figure 5: National, Provincial Road Network and *Kabupaten* Roads

Source: Joint Assessment Team

Damage and Loss Assessment

There has been widespread but generally minor damage to roads and bridges in the earthquake affected areas. Total damage costs are 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 losses are anticipated.

Damage to roads includes transverse and longitudinal cracking. Sections of roadway have suffered minor subsidence and pavement deformation mainly due to failure of retaining walls. Damage to bridges includes longitudinal cracking of deck slabs and unfastening of expansion joints. There has also been some subsidence on bridge approaches.

Estimates of road and bridge damage costs are presented in Table 15. Bridge damage accounts for 60% of total costs, national roads for 16% of total costs, while provincial and district roads account for 84%. Two thirds of the damage to sub-national networks is in Bantul and Sleman.

Table 15: Summary of Damage and Losses in Roads[17]

Damage and Losses (Rp billion)			
	Roads	**Bridges**	**Total**
National	2.6	4.8	7.4
Provincial	9.8	7.8	17.6
District/City	6.2	13.8	20
Total	18.7	26.3	45

Source: Estimates of Joint Assessment Team

RAILWAYS

Pre-Disaster Conditions

Railway infrastructure is owned by the central Government and is managed through the Directorate General of Railways of the Ministry of Transportation. It is operated and maintained by the state-owned railway company, PT Kereta Api Indonesia (KAI), which operates both passenger and freight services. The trans-Java railway serves mainly passengers and the southern mainline carries long-distance traffic between Jakarta and Surabaya, as well as local services to the east and west of Yogyakarta. Yogyakarta is one of KAI's more important passenger stations and is also home to the only diesel locomotive workshop.

Damage and Loss Assessment

The southern mainline suffered minor damage to track, station buildings, signals and telecommunications, and to buildings between Delanggu (to the east of Yogyakarta) and Wates (to the west).[18] There was also minor damage to other railway buildings in and around Yogyakarta, including the locomotive workshop, operations buildings, and several guesthouses and messes. Total damage is estimated at about Rp 20 billion. There has been no significant impact on long-distance train operations and services were running more or less normally within a few hours; significant losses are not envisaged.

Preliminary cost estimates have been prepared by KAI's Operating Region VI (DAOP VI) in consultation with the Ministry of Transportation. Strengthening of the rail bed and track realignment along a total length of 800m is estimated to cost around Rp 11.2 billion. Damage to signaling and other installations and to one slightly damaged bridge is estimated to cost a further Rp 2.8 billion. Repair or replacement of 12 damaged station buildings and of other buildings and fencing is estimated to cost around Rp 5.9 billion.

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[17] Updated figures were provided by the provincial public works agency subsequent to preparation of this table. These figures increase the total damage and loss for roads to Rp 68.7 billion. However, no supporting details on the data were available.

[18] A spur line that links Yogyakarta to Bantul has been closed.

Services are operating almost normally other than for temporary speed restrictions imposed on short sections of track. Track work is expected to be completed within a matter of weeks, enabling speed restrictions to be lifted.

CIVIL AVIATION

Pre-Disaster Conditions

Yogyakarta's Adi Sucipto airport is owned and managed by state-owned PT Angkasa Pura I (AP-I) and is served by Garuda and several other scheduled carriers. These operate direct links to other major cities in Indonesia, including Jakarta, Surabaya, Denpasar, Bandung, Banjarmasin, Balikpapan and Makassar, and to Singapore. The runaway length of 2,200 meters allows unrestricted operation of 737 and similar aircraft.

Damage and Loss Assessment

Adi Sucipto airport suffered cracking to the runaway and a section of single-storey, domestic terminal building collapsed. There was also some other minor damage. The airport was effectively closed for two days, and flights were diverted to Solo airport. Emergency repairs to runway cracks were completed quickly and Adi Sucipto was again handling all scheduled services normally and without load restrictions within two days.

The earthquake caused transverse cracking of the runway at three locations and longitudinal cracking in one location. Cracks were up to 3cm wide and typically 5cm deep. Electrical installations and visual aids were largely unaffected but there was minor damage to the control tower, and operational buildings and roads. Grouting has enabled early resumption of normal runaway operations but longer-term airside remedial work including runway overlay, repairs to operational buildings and roads, and equipment, is estimated to cost Rp 13.8 billion.

The domestic departure lounge, which was constructed in 1984 and covers an area of 1,200m^2, collapsed and requires total replacement.[19] The domestic check-in and lobby areas suffered cracking, and the Flight Information Data System was damaged. Total costs of reconstruction and repairs are estimated at Rp 5.4 billion.

Estimates of lost revenues from passenger service charges, parking, and cargo handling were totaling to Rp 150 million during the closure. These costs may have been more than offset by increased revenues at Solo, and subsequently by significantly increased passenger and cargo volumes as a result of the earthquake.

POST AND TELECOMMUNICATIONS

Damage and Loss Assessment

Damage to post and telecommunications installations was minor and phone services were again operating almost normally in most areas within a few hours.

Very limited physical damage to telecom facilities has been reported. Postal services are operated by state-owned PT Pos, which reported damage to its Yogyakarta regional office and central sorting office, and to numerous branch and sub-branch offices and staff housing. In the light of PT Pos damage reports provision for a Rp 7 billion has been made for repairs.

The damage to the infrastructure was relatively limited. The worst affected was energy sector. However, much of the damage to the equipment was repaired within approximately ten days. Overall, it appears that water supply and sanitation services, aviation, and telecommunication are only temporarily affected. Most of the road damage occurred on provincial and district roads.

This damage assessment was mostly done based on visual inspection. A thorough assessment of potential underground damage of pipes, sewer systems, and septic tanks; water quality, structural integrity of bridges, and railway tracks should be undertaken. Given the possibility of aftershocks, this may be of particular importance to ensure operational safety.

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[19] Departing passengers are now waiting in other locations, causing some very minor inconvenience.

Preliminary Recommendations

Moving forward, preliminary recommendations include:

- Mobilize a labor-intensive approach to cleaning and rehabilitating wells and toilets;
- Ensure that below-ground water and sanitation infrastructure is included in site preparation, with appropriate distance of wells from septic tanks to avoid further contamination; PLN should be prepared to extend house connections.
- Embark on a province-wide program to increase access to good quality water supply and sanitation services. This would include a yearly PDAM expansion program, as well as community-based systems.
- Rehabilitate district roads and bridges rapidly to avoid further deterioration during the rainy season.

Social Sectors

Prior to the earthquake, the Human Development Index of Yogyakarta Province was Indonesia's third highest, with Central Java being closer to Indonesia's average. The health status of Yogyakarta is one of the best in the country, closely followed by Central Java. The places affected by the earthquake are also important centers of learning, with a high concentration of universities, secondary and primary schools and very high enrollment rates. The area is Java's major center for the arts and has a number of sites of high spiritual and cultural significance.

A large part of social services are provided by the private sector. The private sector plays a dominant role in delivering health care and a major role in education. Most social welfare facilities belong to private charities and the vast majority of cultural assets are places of worship, which also serve as centers for community activity and are financed, managed and operated by the community.

The earthquake caused an estimated total of Rp 4.0 trillion in damages and losses in the social sector. The earthquake took a major toll on social services in Yogyakarta province and Klaten district of Central Java province. Key features of the effects are:

- Over Rp 3.2 billion (82%) of damages are in health and education.
- More than half (53%) of damages and losses in social services are to the private sector.
- Damages and anticipated losses represent 98% and 2%, respectively.
- Bantul district and Yogyakarta City were most severely affected.

Table 16: Summary of Damages and Losses in Social Sector (Rp billion)

Social Sector	Effects			Ownership	
	Damages	Losses	Total	Private	Public
Education	1,683	56	1,739	585	1,154
Health and Family Planning	1,525	21	1,546	996	550
Facilities for the Poor and Vulnerable	44	0.1	44	34	10
Religion and Culture[20]	654	0.0	654	498	156
Total	3,906	77	3,982	2,113	1,870
% of Total Damage and Losses of All Sectors	17	1.2	14		

Source: Estimates of Joint Assessment Team

[20] Tourism damage and losses are included in the Productive Sectors.

EDUCATION

Summary

The total damage and losses in education for the two provinces of Yogyakarta and Central Java are estimated at Rp 1.74 trillion. Total damage in Yogyakarta province was assessed at Rp 1.3 trillion for buildings and Rp 58.8 billion for educational equipment. Total buildings and equipment damage was about Rp 320 billion in Central Java, with 60% of this occurring in Klaten district. Loss estimates included the costs of temporary school facilities, recruitment and training of new teachers, payment of temporary teachers to replace those severely injured, clean-up costs and counseling. The total losses for Yogyakarta and Central Java are estimated to be about Rp 55.8 billion.

Pre-disaster Conditions

The province of Yogyakarta is a major Indonesian center of learning, with a high concentration of universities, secondary schools and primary schools. Educational achievement in Yogyakarta is well above the national average, whereas in Central Java it is close to the national average.[21] In 2004, net primary school enrollment rates were close to the national average, at 93%, with similar participation for girls and boys. The transition rates to the junior secondary and senior secondary levels were higher in Yogyakarta than Central Java, with participation rates of girls exceeding boys.[22] These high transition rates explain Yogyakarta's 43.6% net enrollment rate in tertiary education, well above 6.9% in Central Java and 8.6%[23] national level. Physical access to schools in Yogyakarta is a major factor in achieving high enrollments. In 2005, 70% of all villages in Yogyakarta had a junior secondary high school compared with only 30% in Central Java and the country as a whole.

The private sector plays a major role in delivering educational services. The private sector accounts for 22% of all primary educational facilities, 51% of all junior secondary schools, and 60% of all senior secondary school facilities in the two provinces. As its facilities tend to be larger, the government continues to provide educational services to a larger share of students than the private sector. At the same time, and contrary to the experience in other countries, the private educational facilities tend to attract a larger number of poor people whose children do not succeed at entry exams for public schools or who cannot afford the fees for uniforms and books required in public schools.

Damage and Loss Assessment

The earthquake has had a major impact on the education sector. In Yogyakarta some 2,155 educational facilities were damaged or destroyed. Bantul district, Yogyakarta, was the most severely affected district, with 949, or over 90% of educational buildings damaged or destroyed. In Central Java, 752 buildings were damaged or destroyed. Klaten district

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[21] This includes public and private schools, vocational schools, and schools supervised by the Ministry of National Education and the Ministry of Religious Affairs.

[22] Net enrollment rates in Junior Secondary Schools in Yogyakarta 77.7, Central Java 67.8, and Indonesia 65.2.

[23] 7.8 girls and 6.1 boys. In Central Java, participation in tertiary education is more male.

experienced the highest level of damage in this province, with 64 buildings destroyed and 257 buildings severely damaged, which represents about 38% of the buildings in the district. At the time of assessment, 36 teachers had been reported killed, with twice as many injured.

The quality of school buildings was a major aspect 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 grant funds. 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.

As mentioned earlier, estimates of the cost of utilizing temporary school premises, the cost of recruiting and training of new teachers, the payment of temporary teachers and the cost of cleaning debris of the affected premises were calculated. These are considered losses that will occur in the medium term, until the education system is brought back to normal operation.

Table 17: Summary of Damage and Losses in the Education Sector (Rp billion)

	Effects					Ownership	
	Damage			Losses	Total	Public	Private
	Buildings	Equipment	Sub-total				
Yogyakarta Province	1,304	59	1,363	44	1,406	910	496
Central Java Province	317	3.0	320	12	332	245	88
Total	1,621	62	1,683	56	1,739	1,154	585

Source: Estimates of Joint Assessment Team

Key Issues

Urgent action is needed to avoid greater damage, which in turn will exacerbate losses, and also to ensure student safety. Field observation indicates that some schools, while they may appear safe, have sustained serious non-visible damage that could be hazardous to children. Since many of these schools were built up to 35 years ago and did not follow seismic safety standards, complete reconstruction should take priority over repair and rehabilitation.

Given that losses are extensive, reconstruction will need to be phased in such a manner that all students are provided with some access to school facilities simultaneously.

Preliminary Recommendations

- **A technical assessment of all remaining school buildings is urgently required in order to identify facilities safe to use**. Meanwhile, temporary schools should be prepared for all destroyed schools and for damaged schools until these can be proven safe.
- **A community approach should be undertaken for reconstruction of educational facilities based on Ministry of National Education's community-based new school building programs where the community carries out the construction**. However, adherence to seismic and other safety standards will have to be strictly monitored and enforced.

- **Rebuilding provides an opportunity to redistribute schools**. Demographic change and declining family size shifted demographic patterns and therefore, large number of schools has too few students. Similarly, distribution of teachers is uneven, with some schools having a higher-than-standard of teacher to student ratio. These patterns should be taken into account when determining to rebuild a particular school, and to recruit replacement teachers.

HEALTH AND FAMILY PLANNING

Summary

Total damage and losses in the health and family planning sector in the two provinces of Yogyakarta and Central Java are significant. The total damage is estimated at about Rp 1.5 trillion, while the estimate for losses is about Rp 21 billion. Private practices and hospitals are most affected with almost Rp 1 trillion, or 65%, of damage and losses.

Pre-disaster Conditions

Before the earthquake, the health status of Yogyakarta province was among the best in the country, followed closely by Central Java province, especially in districts adjacent to Yogyakarta. The Human Development Index (HDI) for Yogyakarta is the third highest in Indonesia, while the HDI for Central Java is closer to the national average. The health status of Yogyakarta and Central Java reflects these HDI rankings. By 2002, average life expectancy had reached 73.0 years in Yogyakarta, compared with 68.9 years in Central Java and 67.8 in Indonesia as a whole. In 2004, the Yogyakarta infant mortality rate was 23.3 per thousand live births, well below 34.1 in Central Java and the national average of 35. Malnutrition remains a persistent problem. In 2004, 16.9% of children under the age of five in Yogyakarta and 29.0% in Central Java were underweight compared with the 29.0% national average. The population-to-health-center ratio was about 25,000 in Yogyakarta in 2002, compared with 36,000 in Central Java province and 39,000 country-wide.[24] The high level of coverage in Yogyakarta translates into high quality levels for other indicators. For example, in 2004, 84.7% of births were assisted by modern medical personnel compared with 66.3% in Central Java and 64.3% for Indonesia as a whole.

Yogyakarta province and the Central Java districts surrounding it have long been noted as places for high-quality education and innovations in health services. An important feature of health services is the dominant role played by the private sector, which delivers more than two-thirds of ambulatory care and the majority of hospital care. At the same time, local governments helped to form a strong public sector which, in recent years, has strengthened its role in providing public services and overcoming market failures. For example, new forms of health insurance are being piloted, measures to improve the quality of health personnel and health services are being introduced, and disease surveillance has been strengthened at a time when performance across the country has been low.

[24] 35 health centers (Puskesmas) in Klaten,134 Puskesmas in Yogyakarta.

Damage and Loss Assessment

Estimates of health sector damage resulting from the earthquake are summarized in the table below. The earthquake resulted in the damage and destruction of 17 private hospitals in Yogyakarta City. One public hospital in Klaten district, Central Java suffered slight damage. In Yogyakarta province, 41 private clinics were recorded as being damaged or destroyed and an additional 1,631 private home practices were affected[25]. From a total of 117 health centers (Puskesmas) in Yogyakarta province, 45 were destroyed, 22 severely damaged and a further 16 slightly damaged. In Central Java, two health centers in Klaten were destroyed, seven badly damaged and seven slightly damaged; Magelang and Boyolali districts suffered both slight and severe damage to some health centers. Klaten district recorded the loss of one mobile health clinic. From the 324 health posts (Pustu) in Yogyakarta, 73 were destroyed, 35 severely damaged and 42 slightly damaged. In Klaten district, Central Java, eight health posts were destroyed, 25 severely damaged and 19 slightly damaged; in Sukoharjo district, four health posts were destroyed and one slightly damaged. Three maternity posts (Polindes) were destroyed in Yogyakarta. Damage to public primary health service units (health centers, health posts, maternity posts, and health personnel quarters) was greatest in the districts of Bantul, Gunung Kidul, Sleman, Klaten and Sukoharjo, where the most severely damaged or destroyed units are located. Family planning offices in Yogyakarta also suffered damage but this is not recorded in this report.

Kulon Progo and Gunung Kidul district health offices were destroyed and will require reconstruction. The provincial health training center was slightly damaged and will require minor renovation. There is a high concentration of private medical practices and pharmacies in Yogyakarta province and also in the districts of Purworejo, Magelang, Boyolali, Klaten and Sukoharjo in Central Java. As these private medical practices and pharmacies are mostly located in houses, damage is assumed to be proportional to housing damage, giving an estimated figure for practices either damaged or destroyed.

Table 18: Summary of Damage and Losses in the Health Sector (Rp Billion)

Districts	Damage	Losses	Total
Yogyakarta Province	1408.059	14.636	1422.695
Sleman	198.237	1.487	199.724
Bantul	418.380	4.449	422.829
Gunung Kidul	169.115	1.147	170.262
Yogykarta	604.400	7.420	611.820
Kulon Progo	17.927	0.133	18.060
Central Java Province	101.969	6.004	107.973
Klaten	15.291	0.403	15.694
Other Districts	86.678	5.601	92.279
Total	1510.028	20.640	1530.668

Source: Estimates of Joint Assessment Team

[25] Estimated as a proportion of the damage to the housing stock.

Estimates of losses include the costs of specific health activities in response to the disaster. These include: public health campaigns and trauma mitigation efforts (not yet calculated); human capital needs (recruiting and training permanent and temporary doctors and other health staff) in response to the disaster; facility clean up; and the increases in costs of health treatment in response to the disaster. The total estimated losses are Rp 21.1 billion and are summarized, together with the damage estimates, in the following table.

Key Issues

Clearly, a disaster of this kind has significant immediate effects on the health of the population, particularly in the worst affected areas. Initial concerns center on injuries resulting from the earthquake, the prevention of disease outbreaks and the provision of basic health services.

A potential major community health concern lies in the nursing care and treatment of spinal and bone injuries, especially among the elderly. Here, the healing will be extremely prolonged or never achieved, resulting in permanent disability and confinement to bed, with the additional burden of care falling on other family members.

Relief efforts are being provided by the government and relief agencies in the form of field hospitals, medical supplies and emergency medical and nursing staff. These relief efforts in the health sector are being coordinated by the central and provincial governments. However, there is a major demand for orthopedic surgery, given the nature of the skeletal injuries sustained.

Attention of the relief efforts has also concentrated on measures to prevent disease outbreaks and their detection if they occur. A basic disease surveillance system in the area in and around Yogyakarta has been established, building on existing efforts by the province to strengthen disease surveillance performance. To date, there have not been any significant disease outbreaks.

Provision of adequate amount of clean drinking water is critical. A number of agencies are working on this issue and good progress has been made in many areas. However, sanitation and waste disposal remain major problems.

Adequate staff to provide basic health care services is also important at this stage of recovery. Fortunately, there were relatively few casualties among health personnel and this has contributed to the quick overall recovery of the services in response to the disaster. The response has been a joint effort by public and private providers, together with staff from relief agencies.

Preliminary Recommendations

- Health financing measures will be needed to deal with medium- to long-term care needs resulting from the disaster.
- Long-term care facilities will be required for the disabled with spinal and bone injuries, especially among the elderly, as some families will not be equipped to deal with the required long-term nursing care.
- Reconstructed housing should follow established health standards and include features such as adequate ventilation, in addition to minimum safety standards.

FACILITIES FOR THE POOR AND THE VULNERABLE

Summary

Total damage and losses for these facilities have been calculated at about Rp 43.6 billion. This sum covers a total of 79 facilities serving 3,428 clients, of which 67 are situated in Yogyakarta province and 12 are located in Klaten district, Central Java. The damage to facilities in city of Yogyakarta and its surrounding districts reaches Rp 35.4 billion, or more than 81% of the total damage and losses.

Pre-disaster Conditions

Provincial and district social offices provide public social welfare facilities and supervise private facilities. These private facilities include orphanages, homes for the aged, rehabilitation centers for the mentally or physically disabled and other facilities for people in difficulty such as drug addicts, prostitutes, and the destitute. Most facilities belong to private foundations (charities). At the time of the assessment there were 303 registered public and private foundations in Yogyakarta province and Klaten district, Central Java, with an average capacity of 45 persons. These facilities included 153 orphanages, 64 homes for the elderly—of which 62 were in Yogyakarta—and 54 centers for the disabled.[26] There were also two provincial government training centers for social workers in Yogyakarta. Government-run facilities were clustered around the city of Yogyakarta, while private facilities were scattered throughout the surrounding districts of the province.[27]

Social-protection facilities only provide a small number of social services, while the family remains the main source of support for the vulnerable such as the elderly, disabled, destitute and young. However, this capacity is being increasingly challenged by declining fertility, migration and increased longevity. Average household size is relatively small, at about 3.0 in the city of Yogyakarta, and 3.6 in Yogyakarta province and Klaten district, slightly higher than the national average of 3.9. Many people also live alone: the proportion of single-person households is 19.7% in Yogyakarta province, far higher than the 6.3% in Central Java and the 5.5% national average. The 2003 population census[28] shows that in Yogyakarta province 9.6% of women and 7.6% of men are over 65 years of age, again higher than the national average, and 34% of all female heads of households are widowed. With fewer family members at home available to care for the young, sick and disabled and with elderly women more likely to be living alone, in Yogyakarta province and the Klaten district of Central Java social services are increasingly required to complement the family as a social safety net.

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[26] The balance includes 18 centers for the destitute, three centers for drug rehabilitation and one center for prostitute rehabilitation

[27] Boarding schools such as pesantren often serve as orphanages for poor children. However, these are included in the assessment for educational facilities.

[28] The most recent population census was carried out simultaneously with voter registration in 2003.

Damage and Loss Assessment

Damage and losses were valued at about Rp 43.6 billion for 79 facilities serving 3,428 clients. The assessment was based on local government information verified, where possible, by field visits and phone calls.

Table 19: Damage and Losses to Facilities for the Poor and Vulnerable (Rp billion)

	Effects			Ownership	
	Damage	Losses	Total	Private	Public
Yogyakarta Province	35.4	0.1	35.5	26.1	9.4
Klaten District	8.1	0.04	8.1	7.4	0.7
Total	43.5	0.14	43.6	33.5	10.1

Source: Estimates of Joint Assessment Team

Facilities with minor damage continue to function. Alternative but insecure arrangements have been made for clients of facilities that have been severely damaged or totally destroyed. At severely damaged facilities, clients live in sections that withstood the earthquake or, as with those from destroyed facilities, live in tents on the building grounds. This is a precarious arrangement for facilities that provide services for mentally or physically disabled persons. The two social-worker training centers in the city of Yogyakarta, the principle sources of training for those caring for vulnerable groups, require major renovation.

Estimates of losses include the cost of the clean-up and the provision of temporary shelter for destroyed and heavily damaged facilities.

Key issues

The exceptional characteristic of the social protection facilities in the affected areas is that the majority are owned by private foundations and initiatives. This means that communities and individuals play a major role in providing social protection to the poor and the vulnerable. These private foundations rely on support from individuals and communities for running their facilities and providing for the basic needs of clients. In a normal situation such support might not be difficult to find. However, in a disaster situation that affects almost everybody in the surrounding community, such support might become difficult to find. In this situation, clients of these facilities might be in danger of being deprived basic care. This is likely to pose serious difficulties for facilities that provide services and shelter for the mentally and physically disabled people, and the elderly.

Given the large number of casualties stemming from the disaster, there is a strong likelihood that the number of clients at these facilities could rise. Therefore, just at the time when the facilities are under immense financial pressure, they are likely to find themselves in far greater demand for their services than before the earthquake.

Preliminary Recommendations

- **It is important that the government provides timely support to quickly rehabilitate and reconstruct heavily damaged or destroyed facilities**. Until the social and economic situation of the surrounding communities returns to normal, support is also required, to provide for the basic needs of clients,.
- **Financing mechanisms are required to rehabilitate and rebuild private facilities as these comprise more than 80% of all facilities**.
- **Local governments and relevant offices should anticipate a significant increase in demand for the services of facilities for the poor and vulnerable**. Such anticipation will avoid overcrowding of facilities in the disaster affected areas and additional strains being placed on facilities that have already been weakened by the disaster.

RELIGION AND CULTURE

Summary

Total damage to religious buildings and property in the two provinces of Yogyakarta and Central Java is estimated to be in the order of Rp 514 billion, with the vast majority affecting private buildings. Over 1,300 communities in the two provinces no longer have any place for religious worship. Meanwhile, damage to cultural buildings and monuments is estimated to total about Rp 140 billion. Losses are mostly in the form of lost revenues from tourism. As such, these are included in the productive sectors.

Pre-disaster Conditions

Participation in religious life is high in Yogyakarta and Central Java. A large majority of the population of both provinces is Muslim, followed by relatively small minorities of Christians, Buddhists and Hindus. The Department of Religious Affairs is responsible for Islamic marriage and divorce registration through its sub-district level offices. In addition to the state Islamic schools under the supervision of the Ministry of Religious Affairs, the ministry also registers and supervises Islamic religious study centers such as the Pondok Pesantren. There are many village-level religious facilities, averaging 75 households, or 300 persons, per religious facility. In addition, there are other community organizations, such as burial societies, some of which also run facilities.

The earthquake-affected area is home to Prambanan, a 9th century World Heritage site, and numerous other national heritage sites, reflecting Indonesia's history both as a center of ancient civilizations and the more recent Javanese royal heritage. There are 11 major Hindu-Buddhist temple complexes, one major and one minor royal court, two royal burial sites and 16 museums. These sites are primary attractions for international and domestic tourism, providing a significant source of employment in Yogyakarta and Central Java. Both provinces are major centers for the study of arts and culture. Beyond this, the courts and burial sites continue to play a spiritual role in the lives of many ethnic Javanese.

Places of worship serve multiple functions as centers for community activity and village governance, in addition to their role as places for religious activity and learning. Places of worship provide a channel for dissemination of community news as well as development and government information.

Damage and Loss Assessment

About 20% of all religious facilities in Yogyakarta province and 10% of Central Java province were damaged or destroyed. The assessment focuses on the replacement value of the assets that were destroyed. Damage was reported by the provincial offices of the Ministry of Religious Affairs. In Yogyakarta province, 2,201 facilities were damaged or destroyed, about 20% of all the religious facilities in the province. In the earthquake-affected districts of Central Java, 827 facilities were damaged or destroyed, representing less than 10% of the total. No information was available on staff, or on staff losses, and no estimate of losses was made.

Table 20: Summary of Damage and Losses to Religious Assets (Rp billion)

	Effects			Ownership	
	Damage	Losses	Total	Private	Public
Mosques and Prayer Houses	479.1	0	479.1	479.1	0
Religious Affairs Registry Offices (KUA)	5.0	0	5.0	0	5.0
Churches/Chapels, both Catholic and Protestant	17.1	0	17.1	17.1	0
Pura (Hindu Temples)	0.9	0	0.9	0.9	0
Vihara (Buddhist Temples)	1.0	0	1.0	1.0	0
Provincial Religious Affairs Offices	9.1	0	9.1	0	9.1
Official Houses	1.8	0	1.8	0	1.8
Haj Dormitory Facilities	0.03	0	0.03	0	0.03
Total	514.0	0	514.0	498.1	15.9

Source: Estimates of Joint Assessment Team

The earthquake has left 1,345 communities or about 100,000 families without a place to worship. Another 1,683 places of worship require minor renovation. Religious facilities are financed, managed, and operated by the community. The value of the damage can only best be approximated as the days of labor required for reconstruction. The estimated damage is valued at about Rp 498 billion for both Yogyakarta and Central Java This is the equivalent to some 16,600 man years of labor based on the minimum wage.[29] The cost of establishing religious centers has been spread over many generations. Given the diminished financial capacity of earthquake-affected communities, accumulating funds to rebuild without external support may take a long time.

In terms of archeological and historical sites, a rapid assessment was conducted by the Directorate of Archeology, Ministry of National Education. The monetary value of the damage was roughly calculated and a more precise estimate will only be available after a more detailed assessment has been conducted. The technical annex provides summary information for each site.

[29] Assuming the 2005 minimum wage of Rp 400,000 per month for Yogyakarta and Central Java.

Losses incurred are primarily related to revenues from tourism and have been included separately under productive sectors.

Table 21: Damage to Cultural Sites in the Affected Area (Rp billion)

Site	Effects
	Damage
Yogyakarta Province	50.1
Yogyakarta Palace	0.1
Taman Sari garden and Panggung Krapyak	12.6
Imogiri Royal Burial Center	31.1
Kota Gede Silver Smith City	6.3
Central Java Province	89.6
Prambanan	78.1
Candi Plaosan Lor	1.9
Candi Plaosan Kidul	0.4
Candi Sewu	2.0
Candi Sojiwan	5.0
Candi Lumbung	0.2
Kompleks Makam Sunan Bayat	0.1
Kompleks Masjid Golo	0.2
Acheology Directoralte Provincial Office	1.8
Total	139.7

Source: Estimates of Joint Assessment Team

Key Issues

Reconstruction of places of religious worship will be difficult without some degree of external funding. Large number of places of worship incurred damage and their original construction costs spread across several generations.

Protecting damaged archeological and historical sites from further damage will be important. Such damage could occur from exposure to the weather and human activity. There is an immediate need for improved site protection, conservation and management.

Site closure for restoration work will have severe economic impact on the communities living around the sites. A special program will be required to protect the surrounding communities from adverse impact and to maximize their participation in the restoration and protection of the sites.

Preliminary Recommendations

- **Some assistance should be provided to communities to help rebuild their places of worship and restore community identity**. While these should not be fully financed by external agencies, nonetheless it is essential that some impetus and initial money be provided.
- **For archeological and historic sites, detailed and expert damage assessment will be essential to determine whether structural damage has occurred, estimate the cost of reconstruction and identify initial measures to stabilize the site and prevent further damage**. In particular, the sites must be immediately secured to prevent pilferage.

Productive Sectors

The earthquake has had a devastating effect on the productive sectors of the economy. Damage and losses to the productive sector account for about 30% of the total for the disaster. Large numbers of enterprises, mostly small and mid-sized, shops, traders, and their livelihoods have been destroyed. In light of the pervasive damage to the housing stock, the loss of private uninsured assets is likely to pose the second biggest challenge in rebuilding the affected regions.[30] Irrigation structures, farming systems, and fisheries sectors have also been affected, although the direct impact on agriculture appears limited at this stage. Table 1 summarizes the damages and losses sustained by the productive sector as a whole, amounting to a very significant shock of Rp9,025 trillion.[31] The direct damage to productive infrastructure and assets is estimated to be roughly about half of the total effect. Most of this damage stems from the significant impact of the earthquake on small and medium enterprises (SMEs), which have functioned as the economic backbone of the disaster-affected regions.

Key Principle: A noteworthy factor in the productive sectors is the relative magnitude of the physical damages and the estimated future losses, if the damages are not remedied within a reasonable period of time. **Herein lies** a key message: immediate rehabilitation and reconstruction of damaged infrastructure will restore water for agriculture and prevent future flooding; and provision of liquidity to the affected SMEs will go a long way in containing the indirect (flow) losses of the disaster, by helping them resume their economic activities quickly.

[30] As a result, the financial sector will also be considerably affected. These issues are covered in the cross-cutting section of this Report.

[31] Care has been taken to avoid double counting by not including several categories here.

Table 22: Damage and Losses in the Productive Sector (Rp billion)

Sector	Damage	Losses	Total
Enterprises			
Large Firms	183.7	70.0	253.7
Small and Medium Enterprises[32]	3879.2	3829.0	7,708.2
Sub-total of Enterprises	4,062.9	3,899.0	7,961.9
Trade			
Public Markets and related Infrastructure	165.0	79.8	244.8
Modern Markets (supermarkets/shopping malls)	18.7	39.8	58.5
Sub-total of Trade	183.7	119.6	303.3
Tourism	36.2	17.9	54.1
Agriculture			
Irrigation Infrastructure & Storage Facilities	44.0		44.0
Production Losses		638.4	638.4
Livestock Losses	2.7	0.1	2.8
Farm Machinery, Tools and Equipment	0.1		0.1
Government Buildings (farm extension facilities)	4.0		4.0
Sub-total of Agriculture	50.8	638.5	689.3
Fisheries			
Fishing Harbors	0.1		0.1
Fish ponds, Fish Stock Damage	13.2	1.4	14.6
Local Government and Central Government Assets	1.4		1.4
Sub-total of Fisheries	14.7	1.4	16.1
Total for Productive Sectors	4,348.3	4,676.4	9,024.7
% of Total Damage and Losses	19.1	73.1	31.0

The affected segments of the productive sectors currently employ 650,000 workers. Therefore, unemployment is likely to rise significantly. It will be vital to provide immediate employment opportunities for those rendered homeless and whose livelihoods have been affected. Principles that may be followed in the rehabilitation and reconstruction include:

- Utilizing the strong community linkages in YCJ, for rebuilding shelter and other establishments, to provide job opportunities.
- Reviving SMEs – particularly those in manufacturing, tourism and other ancillary industries – through programs that provide expedient liquidity support. Most SMEs would be willing to contract loans, rather than waiting for grants.
- Reestablishing the trade and services sectors in the affected regions.

"My house is my showroom. I used to sell ceramics worth about Rp 10 million per month here in the local market and send out containers of about Rp 30 million per month to US and Europe. Now my house is totally destroyed, my stock is destroyed; I have orders which I cannot fulfill, and my buyers may go to Vietnam and Cambodia. Our buying seasons are April to October. If I am not back in full business by September, then I will lose a full year – that would be the real trauma that I will face. I have been a good bank customer for many years. I want the bank to reschedule my loan – so I can get breathing space for 6 months. I also want Rp 5 million of new loan just to get my business started again. Once I restart my business, I can take care of myself and my family. I don't need charity; I just want some liquidity – quickly." Pak. Timbul Rahardjo, Ceramic store

[32] Building losses of affected 22,700 micro and small enterprise units that comprise home industries (around Rp 765 billion) may have also been part of housing sector damages

AGRICULTURE, IRRIGATION AND RIVER STRUCTURES

Summary and Pre-disaster Conditions

This chapter presents data on the relative contribution of various sectors to the overall gross regional domestic product (GRDP) of the affected districts (see also economic analysis). Klaten had a large manufacturing base with 23% share in GRDP and 27% share in trade and related establishments. Bantul's economy was supported by agriculture, services and trade equally. Trade and services sectors are very important in Yogyakarta city, which is a center of culture and tourism.

Damage and Loss Assessment

Standing crop losses and potential future production losses dominate the damage and losses in this sector. In particular, the opportunity cost of not fixing the affected irrigation infrastructure and delay in resuming active cultivation would account for almost 90% of the total effects in this sector.

Yogyakarta province: Out of the 58,000 hectares of land used for cultivation, about 590 ha appear to have been moderately affected, and 18,200 out of 48,000 warehouses and storage facilities have been damaged. Some public buildings have also been damaged (4 out of the 44 heavily damaged, with 16 suffering medium damages).

Klaten district, Central Java: About 5,670 ha of land were used for rice cultivation prior to the disaster, and about 360 ha appear to have been moderately affected. In terms of warehouses and storage facilities, 14,873 units were in existence prior to the earthquake, out of which 9,911 units are estimated to have been damaged.[33]

Irrigation Schemes: There are about 476 irrigation schemes totaling 63,800 ha in Yogyakarta, and 409 irrigation schemes totaling 29,190 ha in the Klaten district of Central Java province. Fourteen irrigation schemes covering 36,124 ha in Yogyakarta, and 3,154 ha in Klaten District have been affected by the disaster. Before the earthquake, the damaged irrigation schemes in Yogyakarta produced around 393,800 tons/year of paddy (Rp 474 billion equivalent on the basis of producer prices) and about 153,700 tons of parawija (maize, groundnuts, and cassava etc.) per year (estimated at Rp134 billion). In Klaten district, these figures stood, respectively, at 36,300 tons of rice per year (Rp43 billion) and 12,200 tons of parawija (Rp7 billion).

Based on preliminary assessment by the Ministry of Public Works, irrigation structures in Klaten, Bantul, Kulon Progo, Sleman districts, and Yogyakarta City have suffered extensive damage. In Yogyakarta province, about 65% of the cropped area, or 23,000 ha, dependent on irrigation has been affected (loss estimated at Rp27 billion), and 82%, or 1180 ha, in Klaten (loss estimated at Rp1.4 billion). The technical annex for productive sectors presents further details.

Assuming constant rainfall but no rehabilitation within the first year, the harvest will fall by 347,630 ton, equivalent to Rp 387 billion at producer prices amounting to 10.5% of agriculture sector GRDP in Yogyakarta province. In Klaten harvest will fall by 16,285 tons, equivalent to Rp 18 billion. This would be about 2% of the sector GRDP in the district.

[33] This figure also includes irrigation facilities and buildings.

Table 23: Summary of Damage and Losses in the Irrigation Sector

District/Town	Impact Valuation (Rp billion)					
	Total ((1)+(3))	(1) Damage	(2) Damage Coefficient %	(3) Loss Total	Paddy Loss	Palawija Loss
Bantul	37.7	9.2	5-50	28.5	22.0	6.5
Sleman	257.9	11.3	20-70	246.6	192.0	54.6
Kulon Progo	111.3	6.5	90	111.3	87.7	23.6
Yogyakarta	0.7	0.3	20	0.4	0.3	0.1
Klaten	19.8	1.4	10-90	18.4	16.2	2.2
Grand Total	427.4	28.7		406.8	319.8	87.0

** Damage coefficient: the extent of affected command area due to the damage on main structures.*
***Production Loss: loss is calculated based upon affected command area, cropping pattern, cropping intensity, and yield (ton/ha)*
****Loss value: Loss monetary value is the amount of loss production multiplied by producer price for each crops*
*****Palawija Loss: Producer price for Palawijya is weighted average among Maize, Groundnuts, and Cassava*
****** Cropping pattern, intensity, and yield referenced from JICA (2004)*
*******Producers price for each crops in DI Yogyakarta and Kabpaten Klaten referenced from BPS (2004)*

Flood control and River Structures: There are three main river systems consisting of several tributaries - Progo, Oyo, and Upper Solo - running though Yogyakarta province and Klaten district. As the waters of these main river systems mostly flow from Mount Merapi, sedimentation from Mount Merapi is likely to affect the flow of these rivers and could cause possible flood damages during the rainy season without well functioning river structures.

A number of physical damages to river structures - such as cracks and sliding of dike and wingwall - are reported due to the earthquake in Bantul, Kulon Progo, Yogyakarta city, Sleman, and Klaten. Reported damage to river structures is around Rp 19.1 billion. Though more detailed investigation and prioritization of rehabilitation works in terms of preventing possible flood damage will be needed, 7,795 people, 2,100 houses, and 3,720 ha farm yard (equivalent to Rp 22 billion loss) could be affected due to flooding if there is no proper rehabilitation within 6-12 months.

Table 24: Summary of Damage and Losses with Regard to River Structures

District/Town	Impact Valuation (Rp billion)					
	Total ((1)+(3))	(1) Damage	(3) Loss Total (Rp)	Population (Nos.)	Houses (Nos.)	Affected farm yard (Rp)
Bantul	26	7.7	18.3	3,397	953	18.3
Sleman	1.0	0.5	0.5	67	16	0.5
Kulon Progo	7.3	3.8	3.5	848	229	3.5
Yogyakarta	1.5	1.5	NA	3,208	820	NA
Klaten	5.6	5.6	NA	NA	NA	NA
Grand Total	63.7	19.1	22.3	7,520	2.018	22.3

** Population and houses loss: these figures reported by DI Yogyakarta DINAS*
***Loss production: loss for farm yard is rice production loss at producer price during rainy season.*

Key issues in Irrigation and River Structures

- *Prioritize and quickly initiate rehabilitation works* to prevent possible flooding as well as loss of harvest.
- *Implement labor intensive rehabilitation works* and involve the affected farm households to provide livelihood support while incomes from crops decline.
- Ensure adequate quality control, and focus earthquake resilience in rebuilding damaged structures.

Quick Efforts will Stem Significant Future Production Losses

Future production losses in agriculture are about 10 times as much as the disaster's physical damage. Thus, with investments of about Rp 40-50 billion to fix the irrigation infrastructure and damaged river structures, the economic impact of the disaster in the irrigation and agriculture sectors can be significantly mitigated.

ENTERPRISE AND INDUSTRY

Summary

Central Java and Yogyakarta have been the centers of production for furniture, ceramics and handicrafts, among others. The affected regions had upwards of 100,000 SMEs. The earthquake has had an impact on thousands of these enterprises directly as well as through supply chain and other disruptions in intermediation. **It is estimated that about 30,000 SMEs have been directly affected**. Table 4 presents the magnitude of the impact. About 650,000 workers will be affected in one way or another, while about 2.5 million of their dependents will be indirectly affected by the temporary or permanent loss of earnings.

Table 25: Impact of the Earthquake Disaster on SMEs in Yogyakarta and Central Java

Name of Affected District	Number of SMEs (pre-disaster)	Affected Units			Workers in SMEs		Dependents on Formal SMEs	Total Affected
		Formal	Informal	Total	Formal	Informal		
Bantul	21,306	9,588	5,040	14,628	335,570	20,160	1,342,278	1,362,438
Klaten	25,000a	4,500	3,360	7,860	157,500	13,440	630,000	643,440
Kodya Yogya	8,619	776	1,680	2,456	27,150	6,720	108,599	115,319
Sleman	18,558	1,113	1,120	2,233	38,972	4,480	155,887	160,367
Gunung Kidul	21,659	650	560	1,210	22,742	2,240	90,968	93,208
Kulon Progo	22,418	673	560	1,233	23,539	2,240	94,156	96,396
Total	**117,560**	**17.299**	**12,320**	**29,619**	**605,472**	**49,280**	**2,421,888**	**2,471,168**

Source: Estimates of Joint Assessment Team

Industries suffered major losses. Large numbers of business owners, estimated at about 17,300 formal enterprises and 12,320 smaller, informal and household-based enterprises, have been affected. In most cases, the businesses seem to have been completely destroyed. It is estimated that these enterprises were providing employment to at least 600,000 people. On

a rough count, close to 2.5 million of their dependents are likely to be indirectly affected by possible temporary or permanent loss of income flows.

Three large industries have been affected: ceramics and handicrafts; furniture; and leather. Bantul, with close to three quarters of its enterprises affected (14,600 out of 21,300 units pre-disaster), and Klaton with about 30% of its enterprises damaged (7,900 out of the 25,000 estimated units), are the most affected. In addition, about 85 traditional markets seem to have been damaged, with 48 in Klaten.

Urgent support can stem losses. Most entrepreneurs interviewed were of the view that they would easily be able to restore their houses and livelihood, once their business was supported. While all SMEs in general are affected, it is the medium scale enterprises that will take longest to restart their operation (at least 6 months in some cases) due to loss of warehouses, machinery, high value inventories (i.e. furniture, ceramics), sizeable bank loans, and on-going costs to be paid (workers salaries). In addition, only a few enterprises appear to be covered by insurance. Those with moderate damage are still operating between 30-60% of capacity. The small and micro enterprises, with homes as their production base, hope to recover in 3 months if they can obtain financial assistance. This is possible because they still have orders to fulfill and raw materials are relatively simple to obtain.

Key Findings

- Total damage and loss assessment for industry and enterprise sector is Rp7.9 trillion, or 88% of the damage suffered by the productive sectors.
- Quick restoration of financial support could curtail the anticipated revenue losses – currently estimated at Rp3.9 trillion or just about the same level as the damages to fixed assets and inventory. If most businesses are not back in some form of operation by September, potential revenue losses could increase as many SMEs would then miss out on the next buying season.

Direct financial support would involve (i) rescheduling of exiting debts to banks, (ii) fresh loans for working capital and (iii) a temporary place to work. The first two can be accomplished by Bank Indonesia regulations – and initiatives from locally operating banks with Government or donor support, if necessary.

The earthquake had no major impact on the number and availability of workers, and aside from some broken access roads to sub-villages in Bantul district, no other serious damages to roads was reported, so goods are expected to be transported normally. With large numbers of workers and their dependents left to fend for their livelihood, there is significant potential for utilizing the transient labor force created by the disaster immediately in the rehabilitation and reconstruction process. This would put quick cash in the hands of those affected and help economic revival.

Pre-disaster Conditions

Small and medium enterprises dominate the affected area (with a total manufacturing output value of Rp 5 trillion). SMEs represent 97% of the 117,000 business units, 65% of 650,000 workers, and 40% of overall output value. Major contributing sectors are: furniture 25%, handicrafts 25%, and textiles 20%. About 25% of industrial output is exported - combined export value (from all enterprises in these sectors) was US$ 144 million in 2005 (growth of 17% over 2004). Bantul has over 21,000 business units, Gunung Kidul 21,700 units, Kulon Progo 22,400 units, Kodya Yogya 8,600 units, and Klaten – about 25,000 units. Most of the small businesses have access to banks (there are over 120,000 borrowers in the affected areas), direct export channels and many micro-enterprises as supporting industries. There are only 71 large manufacturing and logistics firms.

Quick Feel from the Ground: Survey of SMEs

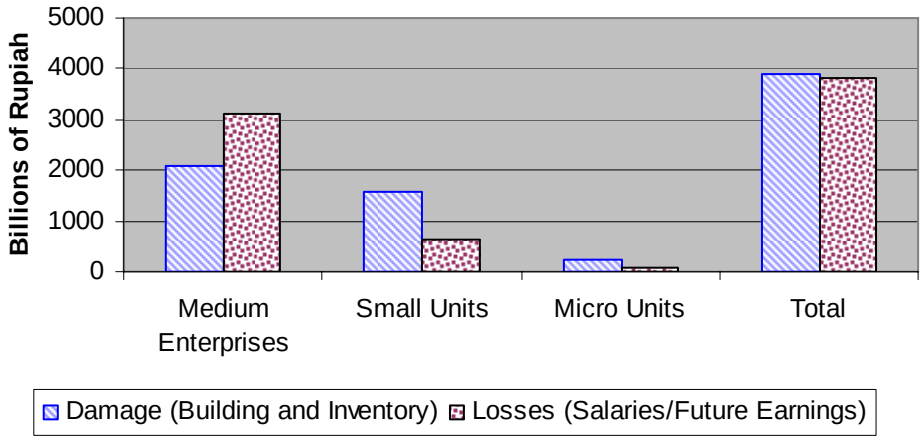
A University of Gajah Mada team undertook a rapid survey in Bantul, Klaten, Yogyakarta city, and Sleman on 4-6 June 2006. Covering over 70 enterprises, the survey focused on: immediate effect of the disaster on the business, including building and inventory damages; current operational capacity; anticipated output or revenue losses; estimated time to get up on feet; personal impact on employees and their families; impact on customers and suppliers; difficulties faced in logistics; and impact on financial institution records. The survey has provided some quick glimpses of the human as well as physical side of the disaster.

Damage and Loss Assessment

The overall estimated damages amount to over Rp 4 trillion. Even without the potential damages suffered by three large establishments (PT ASA; PT Budi Makmur, and PT Sari Husada), the damages are substantial, amounting to Rp 3.8 trillion (Figure 1 and technical annex). The damages stem primarily from immovable property (buildings, and in some cases damaged assets such as equipments etc), and inventory.

Future anticipated losses amount to about Rp 3.9 trillion. Revenue losses were estimated on the basis of estimates of reduced income, lost earnings opportunities and increased expenditures to sustain workers during non-operational period (for medium and large enterprises) etc. over the time period until assets are recovered. A recovery period of 3-6 months is assumed for most of the affected enterprises.

Figure 6: Enterprise Damage and Losses



Source: Estimates of Joint Assessment Team

Key issues

In the short-run: (i) provision of temporary financial liquidity facilities and (ii) loss of homes (that are also work places) need to be urgently addressed to get enterprises back on track. Businesses need to reschedule existing debts and get access to a limited amount of quick fresh loans. But, banks claim that they cannot give new loans without resolving existing ones. Given that most industries operated from homes, the issue of workplaces is part of the overall housing rehabilitation program. In order to avoid future losses due to buyers switching to other producers, currently placed orders should be honored as much as possible on time. The urgency of these interventions is clear: the psychological impact gets worse when people are idle and the future uncertain. Larger enterprises reported that even their workers who have lost their homes and family still prefer to come to work.

In the medium term, the weak role of the insurance sector in providing risk mitigation and risk transfer mechanisms for enterprises needs to be addressed. While many of the SMEs in the area had access to and knowledge of finance products prior to the disaster, only a small minority had insurance cover. Many of those who had, lost natural disaster cover, as insurance firms are reluctant to provide since the 2004 tsunami in Aceh.

Preliminary Recommendations

Preliminary recommendations for the rehabilitation and reconstruction of enterprises and industries include:

- Immediate restoration of livelihoods is critical to the reconstruction phase – and access to liquidity and provision of workplaces can achieve this for the majority of the affected enterprises.
- Use of the transient labor force, and utilizing the local spirit of "nrimo" (accepting and moving on); and "gotong royong" (working together) – will accelerate the reconstruction process.

Key Steps will include:

- Providing access to finance
- Government, Bank Indonesia and commercial banks need to produce immediate guidelines to initiate restructuring loans of their affected debtors and extend new loans to them (with special terms on grace periods and interest rates). Banks have said that debtors in these areas have good credit history with average non performing loans of 3%.
- While waiting for rebuilding of homes, semi-permanent shelters can be put up for each 'sentra industri' to give entrepreneurs opportunities to fulfill their export orders.

TRADE

Summary

Damages suffered to public markets and facilities and modern markets are estimated at about Rp 168 billion. Losses are estimated at another Rp 100 billion, thus placing the overall damage and losses at Rp 269 billion.[34] In addition, the services sector – including restaurants and non-government services – is likely to have suffered damages and losses in the order of Rp 218 billion.[35] Thus, overall damages and losses are likely to be in the order of 2% of the aggregate GRDP in the six most affected districts.

Bantul and Yogykarta have been the worst affected, while Klaten and Gunung Kidul have suffered significant damages and losses. Yogyakarta, due to its dependence on restaurants and services related to tourism, will face challenges unless adequate rehabilitation support is mobilized. Trade has been hit most heavily in Bantul and Klaten. Numerous traditional marketplaces have been damaged or destroyed. Newer facilities such as shopping malls and supermarkets have suffered less. Prices rose temporarily during the week following

[34] Revised figures obtained by the team, after the damage and loss data were compiled, indicate that the damages may be higher at about Rp 222 billion and losses at Rp 146 billion.

[35] As damages in the service sector are also likely to have been captured in the small enterprise data, they are not included under the "Trade" sector for purposes of the overall assessment.

the earthquake for many commodities, in some cases as much as tenfold, but are now subsiding again.

Pre-Disaster Conditions

In recent years, the trade and restaurant sectors have risen slightly in importance in the economy of the six districts considered. The sector now accounts for about 20% of combined regional product, while the non-government service sector has held steady at about 4%. Trade varies in importance from 7% in the city of Yogyakarta to 20% in Kulon Progo, while restaurants range from only 2% in Kulon Progo to 15% in Yogyakarta. The services sector accounts for only 2% of the regional product in Gunung-kidul, but a high of 6% in Yogyakarta. Overall, the relative importance of the combined trade and restaurant sector varies from 7% in Magelang to 24% in Klaten and Yogyakarta.

The number of traditional markets declined 18% between 2003 and 2005, due to competition from modern markets and franchises.[36] The number of modern markets (shopping malls and supermarkets) has grown by one third during the same period. Further, some of the traditional ones have been renovated. In Yogyakarta province, some of the traditional markets take place in semi-permanent/ permanent buildings or in an open area (flea markets). The flea markets in 400 villages in Central Java and DIY provinces open two or three days a week. Another new and fast growing establishment is mini-markets with franchises. In 2005, there were 28,075 licensed traders, most of them small. In total, more than 300,000 people or 10% of the population in the affected areas involved directly in the trade sector in Yogyakarta province, not including the people providing transportation to and from the markets, porters and others whose jobs or businesses related to the market operation. Many workers in Yogyakarta city live in Bantul and other affected areas.

Small traders in the traditional markets are also exporters. Exports/imports data disaggregated by traders are not available, but total exports and imports from the DIY province in 2005 show an increasing trend.

Damage and Loss Assessment

Traditional Markets

The combined damage and losses incurred by traditional markets in Yogyakarta Province and Klaten is estimated to be in the order of Rp 245 billion.[37] Damage and

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[36] In the traditional market, transactions are manually recorded or not recorded at all, buyers are individuals or small traders, the products sold are mostly daily needs and clothes, and the buildings are managed and owned by the local government. Business development and other support for traditional markets is provided by the Trade and Cooperative Office (Dinasperindagkop)-under the Ministry of Trade but the traders in the traditional and modern markets and franchises report their transaction to the Tax office – under the Ministry of Finance.

[37] As noted in the first paragraph under the trade and services section, revised data as at the time of finalizing this report indicate a higher damage and loss figure of up to Rp370 billion. The revised figures will be reflected in the next round of damage and loss assessment.

losses were highest in Bantul and Klaten, followed by Yogyakarta city and Gunung Kidul. Many markets are completely unaffected, such as Pasar Bantul - the largest traditional market in Bantul, while parts of Niten, Imogiri, Plered and Piungan markets, also in Bantul, are completely destroyed. Another 10 markets in Klaten and one market in Yogyakarta are also heavily damaged. Where markets have been closed or seriously damaged, many traders have moved their business to temporary trading places in front of the building or in nearby locations that are empty. Some 2,820 traders in Klaten and another 16,300 traders in Yogyakarta are reported to have moved their locations temporarily. In total, from the temporary closing of many traditional markets in Yogjakarta and Klaten, total income foregone is likely to be at least about Rp 80 billion, including foregone tax revenue.

Some markets have closed until further inspection or until they are rebuilt, while others started to operate again within a few days. In many locations, the value of daily transactions has declined - for example in Bringharjo, the largest market in Yogyakarta, where it went down from Rp 1.2 billion prior to the disaster to Rp 0.8 billion afterwards. In some other markets, the damage is not significant but their staff's property or families were affected so they could not work temporarily. Traders in the traditional markets do not insure their assets and do not use warehouses so their assets are largely irrecoverable when the buildings are damaged.

There are additional losses, besides the foregone incomes. When some markets stopped operating and both production and transportation of some commodities were disturbed for several days, shortages of daily need commodities developed and their prices escalated and this potentially could have reduced the purchasing power of those with fixed income – a loss that cannot be accurately captured in the assessment.

Modern Markets

The combined damage and losses incurred by the modern marketplaces are estimated to be less than 30% relative to traditional markets. This is largely because the buildings are newer and less prone to earthquake damage. Based on limited information available, it appears that Bantul has suffered the most, followed by Yogyakarta and Klaten. The loss of business due to damaged structures has at least partly been offset by gains from sales to people who normally buy in traditional markets, as well as sale for relief efforts. How much of the trading and employment from the traditional markets has been absorbed by the more modern ones is a phenomenon to be checked. In the near future, there is a possibility of losing foreign markets because some exports cannot be delivered as scheduled and there is a need for additional spending by employers for new recruits to replace their lost staff.

Restaurants

While restaurants in damaged buildings have sustained significant damage and losses, many others are likely to have benefited from increased activity. Although data are not available, estimates of damage and losses based on anecdotal evidence suggest a

figure in the order of around Rp150 billion.[38] Potential losses to the economy as a whole are likely to be offset by customers opting for open air restaurants or warungs.

Non-Government Services

Damages and losses in this sub-segment are likely to be modest. Though no reliable data have been collected to date, estimates are in the order of Rp 60 billion. Most services are located in Yogyakarta and Sleman districts, but the impact of the earthquake appears to have been much greater in Yogyakarta.

Key Issues and Preliminary Recommendations

With job losses, the informal sector share of employment will rise. With those affected taking up whatever opportunities available, it is quite likely that the formal sector will shrink in the immediate aftermath of the disaster.

Although the impact on people is harder to gauge, many of those working in these sectors are suffering hardship. Since self-employed traders in the traditional markets rarely insure their stock or use warehouses, many have lost assets as a result of collapsed buildings. Others have been unable to resume business, due to loss, damage or trauma in their own families or homes. The inevitable decline in tourism will particularly hurt restaurants and many other enterprises in the service sector that cater for tourists. Employees of these establishments and those that were damaged or have closed down have at least lost wages for a time or even their jobs.

The first priority is to assist those that have lost jobs, income or assets in these sectors. Efforts should be made to organize labor intensive programs to clean up, repair and reconstruct public facilities. Funds should be allocated to offer a compensation package to those whose business has suffered damage to premises and equipment or loss of trading income. NGOs and other organizations skilled in micro-credit should be mobilized to offer assistance to those in need, possibly through group lending.

In addition, funding should be mobilized to repair and reconstruct traditional marketplaces. In the meantime, local government should allocate space for temporary markets, pending the reopening or reconstruction of damaged facilities. This could be in parks or plazas or on unused public land, but these sites should be close to the marketplaces they replace, and easily accessible to potential customers.

[38] As noted earlier, this is not captured in the overall trade and service sector estimates, as they are likely captured in the enterprise data.

TOURISM

Summary

Preliminary estimates indicate damages of Rp 36 billion and losses of revenue of about Rp 18 billion. Tourist attractions affected by the earthquake are located in the City of Yogyakarta, in the districts of Sleman and Bantul (Yogyakarta province) and Klaten (Central Java). Tourist sites of other districts such as Boyolali or Sukoharjo (Jateng) were not affected. While some damage has been suffered by tourist attractions, managers of establishments interviewed are optimistic that tourism will not be significantly affected.

Pre-Disaster Conditions

As the center of Javanese culture, Yogyakarta province is an important tourist attraction in Indonesia. Trade, hotel and the restaurants sectors (forming an important core of tourism) has been the largest contributor to GRDP, estimated at just above 20% in 2005. In Klaten district tourism is also considered a very important factor for the district promotion but its contribution to the local economy is of much less importance. The historic Prambanan Temple (in Sleman district) and the Sultan's Palace are the most important destinations in Yogyakarta province. The former attracted close to 1 million visitors in 2005, and the latter about 400,000. In Yogyakarta there are 34 hotels and 1,106 motels/hostels. Klaten hosts 42 hotels, and hostels.

Damage and Loss Assessment

The facilities of 9 tourist attractions in Yogyakarta have been damaged. The tourist destinations which were mostly affected by the earthquake were the Prambanan Area and the old King's Graves in Imogiri, Bantul District. In Prambanan both the temple complex and the surrounding facilities such as the Ramayana stadion, the information center and the office of the managing institution PT TWC, a state-owned enterprise, itself were affected. PT TWC estimates the overall damage of the Prambanan facilities at Rp 2,835 million, and the losses due to the decline of visitors, at Rp 1,151 million per month for 2006. Imogiri Cemetry completely collapsed, and the facilities such as the parking places, toilets were also destroyed. The damage to the facilities is estimated at Rp 400 million. Damages in Klaten were found at the entrances and lockets of temples and cemeteries. They amount to a relatively small Rp 390 million/unit.

Accommodation

Currently 6 of the 34 high quality hotels (716 rooms) are closed. The reconstruction phase will last from 3 months (Novotel, 202 rooms) to 12 months (Sheraton, 241 rooms). Other hotels such as Ina Garuda or Melia Purosani are open, but some of the rooms have to be reconstructed.[39] In Klaten 16 out of 42 hotels/accommodations were damaged, most of them located in the Prambanan area.

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[39] The damage to the star hotels was calculated on average (re)construction costs/room for different categories of star hotels. The loss was calculated on the basis of the rooms presently available, the average room rate - based on an occupancy rate of 52%. The occupancy rate was not lowered compared to the pre disaster

Office Facilities

The Tourism Department in Bantul district was moderately damaged. At the moment it is being used for emergency purposes. The Tourist Department in the City of Yogyakarta also suffered moderate damages, but is operating. Out of the 4 Yogyakarta tourist offices only the one at the Airport is slightly damaged. Severely damaged are the Balai Kojran and Taman Budaya. In Klaten only the Dinas Parawisata in the City of Klaten was not damaged, the other three institutions (one of them national: BP3) were damaged. The losses of these public institutions cannot be calculated, because they do not have incomes either.

MOVING FORWARD

With significant human, social, and physical damage suffered, the productive sectors of some of the most vibrant economies in Indonesia have been affected by the earthquake. Given the high concentration of home-based traditional enterprises, hundreds of thousands of households have lost their private domain, and along with it their sources of income. The rehabilitation and reconstruction process should help the affected populations rebuild their lives quickly.

Key Principles in Restoring Lost Livelihoods through Productive Sector Revival

- Invest in fixing physical damages – this would not only put immediate cash for survival into the hands of the affected, but also considerably stem future anticipated income losses. With about half of the total impact in the form of future anticipated losses, the opportunity cost of not responding quickly is very high.
- Mobilize quick financial support in small doses to restore economic activity – contrary to widely-held views, a number of those affected are eager to get credit from banks and other institutions. At the same time, public policy has a major role to play in doing whatever the Government can offer by way of support.
- Learn from vulnerability to disaster, and plan for future ones. Particularly, see what markets can offer to protect enterprises from unforeseen future disasters.

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situation. At the moments the hotels are full with aid workers etc. Then there will be the phase of reconstruction which also promises additional overnight stays. It is assumed that the number of domestic tourists will not decrease, because of regular events (pre Ramadhan, Hari Raya, Haji season, Christmas etc.).

Cross Cutting Sectors

Cross-sectoral analysis includes the sub-sectors government/public administration, the environment, and banking and finance. The damage and loss estimates cover government buildings and equipment, as well as banking and finance institutions' buildings and equipment. In the environment sector, losses were incurred in: a) waste management; b) reconstruction; c) environmental infrastructure, and d) effects on ecosystems and environmental services.

Together, these three sectors account for only about 1% of total damages and losses from the disaster. None of these sectors were significantly affected by the disaster. Most government and banking services were quickly restored. Neither natural ecosystems nor the local government's environmental management capacity were severely affected.

Table 26: Summary of Damages and Losses for the Cross-Cutting Sectors

	Disaster Effects (Rp billion)			Ownership	
	Damage	Losses	Total	Private	Public
Government	137	0	137	0	137
Finance	48	0	48	48	0
Environment	0	110	110	0	110
Total Cross-Cutting Sector	185	110	295	48	247
% Total Damage and Losses	0.8	1.7	1.0	0.2	9

Source: Estimates of Joint Assessment Team

While there were no widespread effects upon physical structures, future losses could be significant if action is not taken soon, especially in the banking and finance sector. While current damages to this sector are relatively light, potential future losses may be as high as Rp 2 trillion, since it is estimated that up to 58,000 current borrowers may default on their loans.

To minimize future losses, it is imperative to support the recovery of the financial sector and address non-performing loans as soon as possible. Policies that prioritize realistic resolution of these problems through restructuring of current outstanding loans, credit guarantee schemes that enable potential SME borrowers to access non-collateralized loans, and potentially, well-targeted subsidized lending schemes could all ensure a more rapid economic recovery in the region.

Key actions undertaken now can mitigate potential future losses in the environment sector. Specifically, it is important to undertake an in-depth assessment of debris removal plans, conduct a hazardous waste management assessment and develop an action plan, as well as design and enforce earthquake resistant building standards for new single story structures and to retrofit damaged ones.

ENVIRONMENT

Summary

The environmental impact of the earthquake is largely confined to four areas: a) waste management; b) reconstruction impacts; c) environmental infrastructure; and d) effects on ecosystems/environmental services. There was no significant damage to natural ecosystems (forests, coral reefs, mangroves, etc.) nor was the environmental management capacity of local government severely affected.

Pre-Disaster Conditions

Waste management is limited. In Yogyakarta Province, collection of municipal waste is limited to the cities, larger towns and markets. Much of the waste collected in the affected area is taken to a sanitary landfill site at Sitimulyo near Piyungan, Bantul district. An uncontrolled site near Godean, Sleman district is used for inert wastes such as construction debris. In Klaten district, Central Java province, municipal waste is collected from Klaten city and larger markets only and taken to one of two small (approximately 1 hectare) open dumps. In rural areas of both provinces, there is no government waste collection or disposal. Villagers typically burn, bury and/or dump waste into local rivers close to their communities. Additional data are needed on systems for disposing of industrial and medical wastes in the affected areas.

Hazard management is poorly enforced. While there is some environmental zoning, housing construction has been allowed along earthquake faults and other high-risk areas such as the slopes of Mount Merapi. Lax enforcement of housing standards has resulted in construction of poor-quality housing stock. Additional hazards include breeching of the Sermo Dam (157 hectares with a capacity to hold 25 million m3 of water) and a nuclear research reactor in the general vicinity of the earthquake.

Water resources are the only significant environmental services. In the affected area there are no significant forest resources, fragile coastal areas or other valuable ecosystems. Mount Merapi National Park is the closest major protected area to the disaster zone. The area's most important environmental service is water resources. Extensive karts aquifers occur directly south of Yogyakarta, mostly in the Gunung Kidul area.

Damage and Loss Assessment

Disasters cause damage to environmental assets and losses of environmental services. In this case, no damage to assets has been estimated; losses, however are described below.

The most significant component of environment-related losses appears to be management of debris. It is crudely estimated that between 30-60% of the debris from each house can be reused directly in reconstruction. While many villagers reported they would make use of the rubble, the volume of waste that will need to be disposed of outside the village areas could be as much as 2.25 million m3. The government does not anticipate problems in finding disposal areas or significant impacts to the capacity of municipal landfills.

Costs of debris removal are crudely estimated at Rp 110 billion for up to one year. The Government is assuming that the labor costs associated with clearing each house area of debris will come from the anticipated Rp 30 million to be given to each family for reconstruction. It is estimated that five laborers (Rp 20,000/day) can clear a destroyed house in two weeks (Rp 1,200,000 per house) or Rp 230 billion if all destroyed and severely damaged houses were cleared in this way. The demolition of damaged government buildings will incur additional losses that need to be estimated once structural assessments have been completed.

There are several potential threats from hazardous wastes at industrial and medical sites. The media reports that 23 industrial facilities experienced damage ranging from 25 to 100%. Reported impacts include localized pollution from damage to three textile factories, leakage from tannery residue ponds in Klaten (reported by UNIDO) and an oil leak from storage drums at PT Samitex Sewan (reported by Ministry of Environment). The only damage to waste collection disposal sites has been a crack in the leachate pond of the Sitimulyo regional landfill site (located near Piyungan in Bantul) that could pollute the nearby river. With over 36,000 additional medical procedures being performed to treat the injured, a large quantity of medical waste has been generated; it is unclear whether this is subject to proper disposal. The cumulative impact of these problems can include both human health effects (with associated medical and productivity costs) and ecosystem damages.

One principal environmental loss is likely to be the environmental impact of sourcing reconstruction building materials. Large-scale rebuilding and repair of houses and other structures will require important supplies of natural resources, e.g. wood, bamboo, clay soil, and sand. Accelerated extraction of these resources to meet increased demand could result in negative environmental impacts.

A second major loss is the reduced functioning of environmental services, especially groundwater. The District Environment Impact Management Agency (Bapedalda) in Yogyakarta reports increased groundwater turbidity in localized wells as well as piped water systems. The groundwater structure also appears to have been affected by the earthquake and aftershocks with reports that a number of wells have dried up. This is especially a possibility in the karst and cave areas, where modified underground waterflow would affect both wells and springs.

A third major loss will be the additional environmental assessment costs for the reconstruction. Reconstruction will place increased demand on the area's institutional capacity for environmental management. Greater administrative costs will be incurred for environmental impact assessment of new investments, enforcing environmental standards and monitoring of mitigation measures.

Finally, another loss is the increased vulnerability to landslides resulting from the earthquakes. The Ministry of Environment reports at least six new vulnerable areas, where there have been landslides since the main quake. These can and have resulted in incremental damage to roads, homes and infrastructure from soil movement, flooding and impact of boulders.

No losses are anticipated for waste management and debris disposal, unless the volume of waste requiring disposal either accelerates the need for additional waste disposal capacity or if the areas of land used to dispose of the earthquake debris are currently productive.

Key issues

Key issues associated with **debris and waste management** include: a) resumption of municipal waste collection services in Bantul, which ceased due to the earthquake; b) potential impacts to sanitation in villages due to the increased demand for waste disposal following receipt of aid; c) the safety of villagers and workers involved in demolition; d) potential environmental impacts of debris disposal in inappropriate emergency dumpsites; and e) possible risks from hazardous wastes (e.g. from a greater volume of medical waste at existing and new treatment facilities and from industries with damage treatment plants). For the **reconstruction**, issues include: a) maximizing the recovery of resources for rebuilding in order to both reduce costs and environmental impact; b) ensuring that disaster-resistant building standards are both developed and enforced as part of the reconstruction; and c) applying environmentally-sound design principles throughout the reconstruction (e.g. for spatial planning, building construction, energy supply, water and sanitation).

Preliminary Recommendations

Preliminary recommendations for the environmental dimension of the rehabilitation and reconstruction process include:

- More in-depth assessment of key impact areas. For debris this would include: updating the estimate of earthquake debris that will require disposal, environmental evaluation of debris dumpsites selected in each sub-district, need for accelerated planning for new facilities and assessing options for the further recycling/ processing of earthquake debris and implement programs to minimize waste requiring disposal.
- Conduct a hazardous waste management assessment and develop an action plan for waste management more generally.
- Develop and apply "green" rebuilding guidelines to promote reconstruction that reduces environmental impact and minimizes use of scarce natural resources. Such guidelines were developed by WWF for the recovery process in Aceh and Nias.
- Design and enforce earthquake-resistant building standards for new single-storey dwellings as well as for retrofitting damaged structures.
- Consider mechanisms to facilitate the use of sustainable construction materials, such as the concept proposed by GTZ in Aceh to provide a facility that distributes legally-sourced, environmentally-friendly building materials along with tools, means of transport and technical advice on earthquake-resistant construction.
- Assess the impact of the earthquake on environmental services, especially the groundwater system.
- Develop and implement a disaster preparedness plan and system for the region at risk.

PUBLIC ADMINISTRATION

Summary

The total damage and losses to governance structures and public administration in Yogyakarta and Central Java provinces is estimated to have reached Rp 137.0 billion. This figure is based on preliminary observations in 10 districts and reflects estimated damage to or loss of buildings, equipment, personnel and public records. The immediate challenge is to restore basic public administrative functions, to strengthen the capacity of local government (province, district and kecamatan levels) to handle a potential volcanic eruption and to organize relief recovery and reconstruction activities.

Pre-disaster Conditions

The regional public administration structures in pre-disaster Yogyakarta and Central Java were relatively sound. The main issues included such nationwide challenges as corruption, lack of institutional capacity, inefficient delivery of public services, insufficient financial resources, and unclear relationship between the center and regional administrative units.

Damage Assessment

Following the disaster of May 27, 2006, total damage to buildings was estimated at Rp 128.7 billion, with the district of Klaten accounting for 60% of these damages. The replacement value of lost equipment is thought to have reached Rp 6.4 billion. Additional damage, totaling Rp 1.9 billion, includes replacement costs of public records which were destroyed and costs associated with loss or injury of personnel.

Damaged infrastructure and the direct involvement of staff in immediate relief efforts affected the operation of public administration in Yogyakarta and Central Java. However, law and order were rapidly restored. Police presence is visible on the ground and the command hierarchy was gradually restored. Investigatory, prosecutorial and adjudicatory services were suspended temporarily to various extents depending on the severity of the damage.

Table 27: Summary of Damage and Losses in the Public Administration Sector

	Effects (Rp billion)			Ownership (Rp billion)	
	Damage	Losses	Total	Private	Public
Buildings	128.7		128.7		128.7
Equipment	6.4		6.4		6.4
Personnel	0.1		0.1		0.1
Public Records	1.7		1.7		1.7
Total	137.0	0.0	137.0	0.0	137.0

Source: Estimates of Joint Assessment Team

Affected communities continue to suffer from poor access to district or sub-district officials (to conduct needs and damage assessments or obtain information on the status of government recovery and rehabilitation interventions). NGOs and charities supply basic relief and information. Key municipal services such as water supply, drainage, and electricity have remained operational albeit with shortcomings in the core disaster areas.

Preliminary Recommendations

Based on this preliminary and partial assessment, the following recommendations can be made:

- Restore public order and security functions to pre-earthquake levels.
- Complete a detailed tally of the damage and estimate the cost of "down time".
- Develop an effective contingency plan for a possible volcanic eruption (avoid the shortcomings observed in Aceh as well as after the earthquake).
- Resume core government functions in usable buildings.
- Organize the collection of key government documents still exposed to natural elements.
- Ensure that the Government's compensatory schemes are well understood.
- Develop a transparent mechanism for managing relief-related funds.
- Coordinate the relief efforts of major donors and facilitate the allocation of funds between various levels of government.

FINANCIAL SECTOR

Summary

Regional development banks (BPDs) and rural credit banks (BPRs) in Yogyakarta and Central Java have been significantly affected but the disaster is unlikely to have a significant impact on the banking sector at the national level. Almost half of BPD Yogyakarta's loans – or about Rp465 billion - might become non-performing and BPD's capital adequacy ratio (CAR) may be reduced to negative 115%. Sixty out of the 65 BPRs in Yogyakarta province have reported loan losses and will need liquidity support, as repayment of loans will dry up and depositors seek to withdraw funds.

Credit markets have a key role to play in the rehabilitation and restructuring process. Banks should extend support to revive economic activity in the affected areas. Bank Indonesia (BI), the government and the banks will have to work to meet emerging needs without dispensing prudent banking regulations and operations.

The damage suffered by Non-Bank Financial Institutions (NBFIs) will affect enterprise revival but remains modest in absolute importance. The depth of NBFIs in the affected areas is small. The combined assets of venture capital, pawn shops and cooperatives together stood at Rp2.3 trillion, or about 16% of the regional financial system assets.

Pre-disaster Conditions

The total assets of the Yogyakarta banking sector at end March 2006 reached Rp 13.6 trillion, or about 1% of the total national banking system. In Yogyakarta province, 25 commercial banks, including 20 private banks, had banking operations conducted through 41 branches and 100 sub-branches. In addition, 65 BPRs had important presence in several of the affected districts providing essential micro-credit support. At end of March 2006, BI data showed that outstanding loans of commercial and rural banks operating in Yogyakarta province were Rp5.9 trillion and Rp0.8 trillion, respectively, or 1% of total outstanding loans in Indonesia's banking sector. Of this, micro, small and medium-scale loans (each less than Rp 500 millions) accounted for Rp5.2 trillion or 80%, indicating the possibility of a large number of loan accounts. The worst affected area is Bantul, with 0.6 trillion in loans, about 8.6% of the banking system credit in the Yogyakarta area. In Klaten district (Central Java), the outstanding loans stood at Rp800 billions, intermediated by 22 commercial banks.

Damage and Loss Assessment

Total damage and losses suffered by banks and NBFIs are estimated at Rp1,998 billion.[40]

[40] To avoid double accounting, the amount of losses of the banking and financial sector will not be included in the total amount of losses for the entire affected area.

Table 28: Yogyakarta-Central Java Financial Sector Damages and Losses (Rp billion)

	Province		Total
	Yogyakarta	Klaten	
Banking	1,250	316	1,566
Infrastructure (buildings, etc.)	37	10	47
Loan Losses	1,213	306	1,519
NBFIs	196	41	237
Infrastructure (buildings, etc.)	6	3	9
Loan/Asset Losses	190	38	228
Insurance Sector Losses	147	48	195
Total Effects	1,593	405	1,998
Damage			48
Losses			1,958

Source: Estimates of Joint Assessment Team

The disaster will reduce the ability of debtors to make repayments, and hence will adversely impact the banks' share of non-performing loans (NPLs). BI estimated a potential loan loss of up to Rp 1.2 trillion or 18% of outstanding loan in Yogyakarta and Rp 300 billion or 30% of outstanding loan in Klaten as 58,500 borrowers find themselves unable to repay their loans. NPLs in Yogyakarta would increase from 2% to 6%. However, because the amount of loans in comparison with the national loan portfolios is small, the impact of the disaster on the performance of the banking sector as a whole and of the national banks is expected to be minimal. Besides, the affected banks appear to have made provisions in their balance sheets for the anticipated loan losses.

The estimated potential loan losses may worsen if the real sector of the affected regions does not recover and if financial institutions continue to face difficulty in recovering loans from the affected enterprises and other debtors. An important factor will be the response of insurance companies to insurance claims of a small number of enterprises: most insurers will be likely to equate the earthquake with *force majeure* and may refuse to compensate the losses suffered.

Some local banks will suffer, in particular, locally owned and operated banks such as the BPD and BPRs that have no business operation outside affected regions. The biggest potential loss will be borne by BPD, whose estimates indicate Rp 464 billion in new NPLs. Bank BRI has estimated the potential amount of loan losses at Rp 175 billion. Among private commercial banks, Bank Bukopin has reported the largest potential loss, of about Rp127 billion. In addition, 60 out of the 65 BPRs have reported a combined increase in the NPLs by Rp133 billion, or 16% of their total loan portfolio.

Damage to banking infrastructure remained limited. Information on customers has not been lost.[41] A few branch offices, ATMs, telecommunications and other equipments have been damaged, but most banks have restored their essential infrastructure. A few banks reported damage to their facilities, including: Bank BRI 3 branches in Yogyakarta, 2 branches in Klaten, and 30 BRI micro-finance units all over the region), Bank Mandiri (4 out of 73 ATMs), BPR (7 totally damaged and 53 mild to moderately damaged), and Bank BPD Yogyakarta (9 sub-branches and several cash offices destroyed).

Table 29: NBFIs in Yogyakarta Province, Operations and Losses

NBFIs in Jogyakarta	# affected	Potential losses	Pre-Disaster Volume of Business	% of loss
Venture Capital: Sarana Jogya Ventura (Private Owned)	55 debtors	Rp 10.3 billion loan losses	Rp255 billion	5
Pawn Business (Pegadaian)				
a. 16 branches of Perum Pegadaian in Yogyakarta	559 debtors and 5 officess	Rp 2.38 billion loan losses and Rp 550 million of building damaged	Rp 650 billion	0.3
b. 6 branches of Perum Pegadaian in Klaten	393 debtors and 4 offices	Rp 2 billion loan losses and Rp 1.2 billion of building damaged	Rp 65 billion	3
1,968 established **Primary Cooperatives** with 580,486 registered members	58,700 members and 100 offices	Rp 14 billion of fund losses and Rp 4.3 billion of offices damaged	Rp 710 billion	7
1,785 registered **Micro finance units** in Yogyakarta, that consist of: a. 75 LDKP (Rural villages credit institutions); b. 42 BMT (Islamic microfinance unit); c. 1,630 BKD (rural credit unit); d. 38 credit unions	N.A.	It is estimated 10% of GRDP on finance in Yogyakarta or about Rp 160 billion	N.A.	
Leasing & Multifinance Company:				
1. Astra Credit Company (Car Vehicles)	1,099	Rp 592 million	Rp 189 billion from 3,429 clients	0.04
2. FIF (Motorcycles)	1,769	Rp 412 million	Rp 129 billion from 21,182 clients	0.3
3. Kredit Plus (personal finance)	112	Rp 312 million	Rp 3.2 billion from 1,496 clients	10
Summary	Rp 190 billion in losses & Rp 6 billion in building and facilities damage.			

Source: Estimates of Joint Assessment Team

[41] Unlike in case of Tsunami affected areas.

The estimated combined effect on the banking sector is about Rp 1,566 billion.

The overall damage to banking infrastructure and facilities could reach Rp 37 billion. Early estimates from the affected banks (BPD, Bank Mandiri and Bank BRI) indicate that the total value of physical damages will reach Rp15 billion. BPD reported Rp5 billion, Bank Mandiri Rp2 billion, and Bank BRI 7.5 billion. Another 10 branches of commercial banks have reported damages.

Early estimates of damage and losses in the Non-Bank Financial Sector (NBFS) are Rp 190 billion.[42] This comprises primarily microfinance loan losses of 1,785 registered microfinance institutions in Yogyakarta. Other NBFIs have reported potential losses of Rp50 billions consisting of Rp45 billion of business value (loan) losses and Rp6 billion in damage to offices and building facilities.

Insurance losses may add up to about Rp 195 billion, but these may rise as more claims become known. Based on early estimates available, the total non-life insurance exposure in the affected area is estimated at Rp 4.2 trillion. Of this amount, 25% is reinsured by P.T. Maipark, and it is estimated that 10% is kept on the insurance companies' books, with the remainder being reinsured offshore. P.T. Mairpark's estimated losses to be around 10%.

Preliminary Recommendations

Moving forward, FIRM (Financial Intermediation and Resource Mobilization) is vital for rehabilitation and reconstruction. Any failure or delay on the part of the financial system to effectively intermediate for economic revival may significantly increase the losses. At the same time, credit markets should not be distorted, either by lack of vigor in pursuing NPLs or by introducing undue moral hazard. The Government may consider various schemes along a spectrum ranging from acting only act as a mediator to providing new loan programs with subsidy elements to keep cost of financial intermediation low. Specific recommendations include:

- **Support real sector recovery and resolution of NPLs**: Potential NPLs should be treated as a commercial problem, and realistic solutions that avoid moral hazard need to be found, without further aggravating constraints faced by the private sector.
- **Adopt accommodative policies and regulations:** Regulations on NPLs may be relaxed, so that loans may be restructured allowing borrowers as well as banks respite in the recovery process.
- **Indirect support through collateral replacement:** Collateral replacement or credit guarantee schemes may alleviate credit market constraints faced by SMEs that are unable to provide collateral, and at the same time, allowing banks to function in a prudent manner.
- **Strengthening the non-bank financial institutions**: Local venture capital institutions, leasing companies, and other microfinance institutions need to be strengthened and support provided for them to meet funding gaps.

[42] Although the data are limited and not consistent.

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Section III.
Economic and Social Impacts

This chapter discusses the broad impact of the earthquake on the livelihoods of people around the Yogyakarta area. It analyses the impact of the earthquake on the regional economy, local government finances and employment, as well as its consequences for poverty and the lives of the people directly affected by the earthquake.

IMPACT ON ECONOMY PERFORMANCE

From the national standpoint, the loss in economic activity in the affected districts is likely to have a minor effect. Before the earthquake, the 11 affected districts contributed about 2.2% to national GDP, and out of those, five experienced only very minor damage and losses. 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 cost of the reconstruction effort and its implications on national Government finances.

The estimated loss in value added in the affected areas amounts to 5.6% of their aggregate GRDP. Given a forecasted growth rate of 5.5%, net economic growth in the affected areas is expected to decline to 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 estimates of economic loss, the projected GRDP for FY 2006 in the area (Rp 51 trillion) can be expected to fall by Rp 2.1 trillion. This is not significant at the national level (the estimated decline is 0.1% of GDP). Assuming a normal recovery it is estimated that 75% of the total loss in value added will have an effect in 2006 (approximately 4% of GRDP) while the remaining 25% will be absorbed in 2007 (roughly 1% of GRDP).[43] (Table 30)

The productive sectors whose performances were most severely affected include manufacturing, energy, water and sanitation, and services. They are expected to decline by 20%, 5%, and 2% respectively (table 31). Other sectors fared better, with an anticipated decline of less than one percent over the next two years.[44]

Bantul district's economy is expected to be the most heavily affected by the earthquake followed up by Klaten and Kulon Progo (GRDP is expected to decline by 23%, 9% and 7% respectively in 2006 compared to pre-earthquake projections).[45] The aggregate decline in GRDP in the whole of Yogyakarta in 2006 is estimated to be approximately 6.7%, whereas the impact in Central Java is only 0.24% (Table 32).

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[43] The loss in value added was estimated based on the estimated economic loss (as reported by each individual sector) weighted by the sector-specific valued added factor computed from an input-output matrix (latest available 2000). Economic losses in the services sector were imputed by applying this sector's share on the affected areas' GRDP to the estimated losses in the housing sector.

[44] No loss assessment of the mining sector was reported given that this sector represents less than one percent of the GRDP in the affected area.

[45] Net economic growth relative to 2005 in Bantul, Klaten and Kulon Progo, assuming the pre-disaster expected growth rate fixed at 5.5% are (-17.7%, -3.5%, -1.5% respectively). See annex tables for details on the methodology employed for computing the loss distribution across districts.

Table 30: 2006 and 2007 Projections of Nominal GRDP of Affected Areas Pre and Post Disaster by Sector (Rp billion)

	2006		2007	
	GRDP * Projection	GRDP Projection minus loss	GRDP * Projection	GRDP Projection minus loss
Agriculture	12,556	12,369	13,246	13,184
Construction	3,242	3,242	3,420	3,420
Electricity, Gas & Water Supply	608	575	642	631
Financial Services	3,636	3,636	3,836	3,836
Manufacturing & Services	8,520	6,826	8,989	8,424
Services	8,197	8,038	8,648	8,595
Trade, Restaurants & Hotels	10,199	10,125	10,760	10,735
Transportation & Communication	3,729	3,729	3,934	3,934
Total	51,200	49,055	54,016	53,301

Source: Computations based on Damage and Loss estimations by the Joint Assessment Team. Projections of GRDP for 2006 and 2007 are based on national growth estimates of 5.5 percent.*

Table 31: Potential Economic Impact on Affected Areas per Sector of Production (Rp billion)

Affected Sectors	Share of Sector on Overall GRDP %	Economic Loss	Estimated Loss in Added Value	Input-Output Coefficient	Percent Decline FY 2006	Percent Decline FY 2007
Agriculture	15.8	640	2489	0.39	-1.5	-0.5
Electricity, Gas & Water Supply	1.5	154	44	0.28	-5.4	-1.7
Manufacturing	26.3	3,899	2,258	0.58	-19.9	-6.3
Services	9.3	298	212	0.71	-1.9	-0.61
Trade, Restaurants & Hotels	17.7	138	98	0.71	-0.7	-0.23
Transportation & Communication	6.2	0.2	0.1	0.55	0.00	0.00
Total		5,128.3	2,861.80	--	-4.2	-1.3

Source: Computations based on Damage and Loss estimations by the Joint Assessment Team.

Table 32: Economic Loss per District FY 2006 & 2007 (Rp billion)

	Economic Loss (2006 & 2007)	2006			2007		
		Projected GRDP	GRDP Projection minus loss	% Change	Projected GRDP	GRDP Projection minus loss	% Change
Yogyakarta Province	1,908	24,363	22,730	-6.7	25,727	25,183	-2.1
Bantul	1,439	4,652	3,572	-23.2	4,912	4,552	-7.3
Gunung Kidul	97	3,766	3,693	-1.9	3,977	3,953	-0.6
Kulon Progo	179	2,047	1,913	-6.5	2,162	2,117	-2.1
Sleman	340	7,404	7,149	-3.4	7,819	7,733	-1.1
Yogyakarta	122	6,552	6,461	-1.4	6,919	6,889	-0.4
Central Java Province	599	215,710	215,197	-0.24	227,789	227,405	-0.17
Klaten	684	5,715	5,202	-9.0	6,035	5,864	-2.8

Source: Computations based on Damage and Loss estimations by the Joint Assessment Team

The decline in economic performance will be partially offset by increased activity in the construction sector during the reconstruction stage. However it is too early to estimate the rates of reconstruction, which depend on the availability of financing and the installed capacity of the construction sector. In any event, the growth of the construction sector will not be enough to offset the overall decline in production in the short run.

IMPACT ON EMPLOYMENT

Preliminary estimates suggest that the reduction in economic activity will result in the loss of around 130,000 jobs. This represents about 4% of the total pre-earthquake employment in the affected areas. As a consequence, the unemployment rate is expected to rise from 7% to around 11% (Table 33).[46] The services sector is hardest hit, and accounts for most of the total job loss (55%). The services sector includes workers in the trade sector that are typically self-employed or represent small and medium-sized enterprises. Close to 70,000 people may have lost their primary source of income. Agriculture, while accounting for over 45% of employment, will lose around 1.1% (17,000 jobs) as a result of the earthquake. Damage to fields and to crops appears to be limited. Some 730,000 workers were employed in industry (comprised of construction, manufacturing, utilities and mining) of the affected area. In the district of Bantul alone, close to 30% of workers employed in licensed establishments were occupied in the handicraft and related sector. As the vast majority of these establishments were small-scale, often also serving as homes, employment losses in this sub-sector are estimated to account for a large share of manufacturing job losses due to the earthquake.

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[46] Employment losses are estimated by examining the share of employment in each of the categories of agriculture, industry and services in the affected districts using data from the Dinas Tenega Kerja Transmigrasi Propinsi D.I. Yogyakarta and BPS. The baseline data was then multiplied to shares of districts affected and sector employment destruction rates compiled based on reports from government agencies, staff on the field and media. Shares of district affected range from a low of 0.1% Magelang to a high of 70% for Bantul. An employment destruction rate of 5%, 20%, 25% was used for agriculture, manufacturing and services respectively.

Table 33: Pre-earthquake Employment and Estimated Job Losses by Sector

	Total Labor Force / Estimated Total # of Job Losses	Total Employment / Estimated Percent Jobs Lost			
		Total employment	Agriculture	Industry	Services
Yogyakarta Province	**1,648,624**	**1,504,342**	**706,172**	**326,442**	**471,727**
% estimated job losses	60,698	4.0%	1.8%	5.4%	6.4%
Yogyakarta	233,662	201,998	3,410	52,228	146,360
	4,721	2.3%	0.5%	2.0%	2.5%
Sleman	387,624	346,186	171,368	72,813	102,005
	34,043	9.8%	3.5%	14.0%	17.5%
Bantul	414,794	376,740	143,668	117,878	115,194
	5,956	1.6%	0.5%	2.0%	2.5%
Kulon Progo	288,623	272,591	212,478	29,779	30,334
	12,082	4.4%	2.5%	10.0%	12.5%
Gunung Kidul	323,921	306,826	175,248	53,744	77,834
	3,897	1.3%	0.5%	2.0%	2.5%
Central Java Province	**2,043,515**	**1,919,877**	**849,167**	**404,087**	**666,623**
% estimated job losses	67,764	3.5%	0.6%	5.8%	5.9%
Purowejo	345,720	335,226	171,744	57,616	105,866
	47	0.0%	0.0%	0.0%	0.0%
Magelang	631,918	593,522	318,114	80,818	194,590
	81	0.0%	0.0%	0.0%	0.0%
Boyolali	495,790	464,810	223,570	100,004	141,236
	332	0.1%	0.0%	0.1%	0.1%
Klaten	570,087	526,319	135,739	165,649	224,931
	67,305	12.8%	3.5%	14.0%	17.5%
Total	3,692,139	3,424,219	1,555,339	730,529	1,138,350
% estimated job losses	128,462	3.8%	1.1%	5.6%	6.1%

Source: Sakornas Data and Calculations by ILO, Jakarta

Loss of employment has hit females and males equally. Some 47% of jobs lost, were previously held by women.[47] Nevertheless, the negative impact of the disaster on women also includes a significant increase in their non-paid activities at home.

The future employment situation will depend on the evolution of the reconstruction effort. In the short run, the adult female participation rate is expected to rise as many women will have to take on any type of work in order to survive. Cash-for work programs are one useful way to generate provisional employment rapidly, injecting cash into the community and stimulating the local economy. Rebuilding basic infrastructure and cultural heritage sites through labor intensive cash-for-work programs can be an option. Particular attention should be put on rebuilding the markets and market-supporting infrastructure, as a significant share of the population derives its livelihood from trade and services. Local contractors with a good knowledge of available local labor should be given a lead part in the reconstruction. Speedy rehabilitation of the infrastructure serving the agricultural sector will be warranted as the sector employs the largest share of persons in the affected area. As housing construction picks up, employment in the construction sector will rise and the need for short term compensation measures diminish accordingly.

[47] The table is calculated by applying gender specific employment figures to employment, and assuming that job losses in sectors are not correlated with gender.

Table 34: Estimated Employment Losses by Gender

Provinces and Districts	Estimated Male Job Losses	Estimated Female Job Losses	Female as Percentage of Total
Yogyakarta Province	33,346	27,352	45.1
Yogyakarta	2,554	2,166	45.9
Sleman	19,244	14,799	43.5
Bantul	3,114	2,842	47.7
Kulon Progo	6,181	5,900	48.8
Gunung Kidul	2,252	1,645	42.2
Central Java Province	34,512	33,252	49.1
Purowejo	25	22	46.3
Magelang	43	38	47.0
Boyolali	181	152	45.6
Klaten	34,264	33,041	49.1
Total	67,858	60,604	47.2

Source: Computations based on Damage and Loss estimations by the Joint Assessment Team

IMPACT ON THE FISCAL SYSTEM

The affected areas are fiscally poor and depend heavily on the central government's general allocation transfer (DAU); hence the decline in own source revenues is not expected to have a significant impact.[48] In the worst hit districts of Bantul and Klaten, own revenue sources represent only 6% and 4% percent of their total revenues, respectively. Shared non-tax revenues (from natural resources) are for the most part negligible in all districts (less than 0.1% of total revenues), whereas tax-shared revenue represents less than 4% of total revenues in most of the affected districts (with the exception of Yogyakarta city and Sleman). If regional tax revenues -own source revenues and shared tax revenues- decline proportionally with regional GDP the affected districts would experience a shortfall of approximately Rp 24 billion in 2006 and Rp 7.5 billion in 2007.[49]

[48] For illustration, the DAU transfer accounts for as much as 93 percent of total revenue in Kab. G. Kidul (table 6).

[49] This estimation includes the six most affected districts (all 5 districts in Yogyakarta and Klaten district for Central Java). The simulation assumes that own source revenues and shared tax revenues decline proportionally to regional GDP (as reported in table 32). Projections of revenues for 2006 and 2007 are computed based on data spending realization for 2004 (table 6) and an estimated growth rate (pre-disaster) of 5.5% per year.

Table 35: Estimations of Public Revenue Loss for Affected Districts in Yogyakarta and Central Java Provinces (Rp billion and percentages)

District	2006			2007		
	Projected Own Source Revenue & Tax Shared Revenues	Simulation of Revenue Decline	% Change	Projected Own Revenue & Tax Shared Revenues	Simulation of Revenue Decline	% Change
Kulon Progo	35	-2.3	-6.5	37	-0.7	-2.1
Gunung Kidul	38	-0.7	-1.9	40	-0.2	-0.6
Sleman	107	-3.7	-3.4	112	-1.2	-1.1
Bantul	55	-12.8	-23	58	-4.0	-7.3
Yogyakarta	130	-1.8	-1.4	136	-0.6	-0.4
Klanten	28	-2.5	9.0	30	-0.8	2.8
Total (6 districts)	393	-24	-6.1	413	-7.5	-1.8

Source: Data MOF, computations by Joint Assessment Team

IMPACT ON LIVELIHOODS[50]

Qualitative reports indicate that trauma levels are high in severely affected areas. Children show strong stress reactions – problems with sleeping, feeling scared and crying easily, and experiencing fevers. Adults complain of head and stomach aches, flu and common colds. Stress is increased by the activity of the Merapi volcano. While certain communities are well organized with rubble clearance, etc., in other places, many people are afraid to start repairs on their houses or go to work, especially in agricultural fields. While all involved in the affected areas agree on the need to use community based reconstruction planning, it may take some time before households are ready to engage in planning activities.

Even though the rate of housing destruction is high, people tend to stay near their home. The snap survey found that 74% of the households, whose houses were completely destroyed, lived inside a tent in front of their house. In these circumstances, it is key to ensure a quick recovery of basic water and sanitation in the affected areas. Some villages report that the quality of the water has declined even though the water supply is intact. Women and girls have consistently raised the need for underwear, sanitary napkins and cooking equipment. Basic facilities to ensure privacy are of particular concern for women, especially those menstruating. Several NGOs have expressed concern over the risk of abuse

[50] The information in this chapter is based on qualitative field reports, preliminary findings of rapid assessments conducted in 50 villages, in combination with pre-earthquake statistical information. A snap survey was conducted on June 6 by the University of Gajah Madah and collected information regarding 1600 households in 50 affected villages. The survey sampled from pre-earthquake housing, and collected data on the whereabouts and livelihood situation from the residents, or, if they were not present, from neighbors or community leaders. An important statistical sources used in this section is the poverty map, produced by the Central Bureau of Statistics, that provides estimates of poverty at the sub-district level. These, in combination with sub-district level report on damages are used to calculate the impact on poverty.

of unsupervised children. For example, a young boy expressed "being proud to be able to collect 100,000 Rp just along the road", a vulnerable situation for him to be in.

There is evidence that the earthquake has hit the poor somewhat harder. In the snap survey, 42% of households headed by someone with only primary education reported destroyed housing. For higher levels of education this percentage is around 31%. However, there is no correlation between having received a BLT (unconditional cash transfer) and the destruction of the house. Many poor live in wooden or bamboo houses rather than concrete, which were more resistant to the earthquake motion. Whereas 40% of houses with concrete walls were reported as completely destroyed, only 16% of wooden and bamboo houses were reported destroyed.

The earthquake is estimated to have impoverished an additional 67,000 households and increased the poverty head count 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 was used to assess the impact on poverty.[51]

Table 36: Distribution of Selected Indicators across Households by Severity of Damage

	No Damage	Slightly Damaged	Heavily Damaged	Destroyed	
Received BLT					
Received Cash Transfer (439 Households0	5.2	32.4	26.2	36.2	100
Not Receive Cash Transfer (1125 households)	8.1	28.3	28.4	34.7	100
Education Head of Household					
Elementary School or less (814 hh)	6	28.3	23.0	42.6	100
SMP (284 hh)	9.9	26.4	30.3	32.8	100
SMA or more (542 hh)	9.6	28.4	31.6	30.7	100
Total	7.8	28.6	26.7	36.5	100

Source: Tabulations from survey conducted by UGM on June 6

Table 37: Estimated Impact on Poverty by District

Province	District	Simulated increase in number of poor households	Simulated percent point increase in percentage of poor
Yogyakarta	Kulon Progo	3,050	1.0
Yogyakarta	Yogyakarta	3,890	1.4
Yogyakarta	Gunung Kidul	6,706	1.2
Yogyakarta	Sleman	14,462	1.6
Yogyakarta	Bantul	24,020	3.3
Central Java	Klaten	14,664	1.9
Total		66,792	1.6

Source: Computations by Joint Assessment Team

[51] It was assumed that the number of families that fell into poverty equaled the number of deaths, plus the number of houses that were reported as damaged in the data.

VULNERABILITY AND DISASTER MITIGATION

Early intervention should focus on livelihood support and housing reconstruction in order to mitigate increased poverty and vulnerability to disasters. Many of these poor households have lost vital sources of income when their businesses, which often were housed inside their homes, collapsed. Not only has their short-term vulnerability increased, but it is also unlikely that they will be able to afford to build back safe housing without considerable assistance. Preliminary community surveys by NGOs indicate that community members are unable to afford quality building materials and lack professional skills to build seismically resistant housing suffered. Kick starting the housing reconstruction, in combination with programs that provide affected households with cash (through cash for work, or cash transfers), provide households the means to survive, and focus on rebuilding their livelihoods.

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Annexes

ANNEX: DATA AND METHODOLOGY[1]

Housing

Data:

- Data used for all tables is as of 18:00 hours June 6, 2006 provided by Yogyakarta Media Centre. This figure is reduced by 10% to reflect site visit observations, discussions with on-site relief staff and feedback from beneficiaries.
- The latest census data including housing figures is the Podes Survey of 2003.
- All figures related to housing size, costs, and others are based on field interviews and discussions with local and provincial authorities.
- The number of families and houses for Sukoharjo and Wonogiri has been estimated by using population figures only as no data was available from Podes-2003.

Assumptions:

- Average housing size is approx. 9 x 6 m (54 squared meters (m2)) having 3 to 4 rooms, 1 living area, 1 WC, and 1 kitchen. A typical house has clay tile or iron sheet/bamboo roof, bricks, 8-9 mm steel rods, concrete flooring, a basic WC with septic tank.
- Rebuilding cost is based on current Indonesian construction cost; it is calculated at Rp 1.2 million/m2 less 15% for recycled material.
- Household contents include TV, rice cooker, tape recorder, blender, iron, and small fridge. For totally damaged units, 60% is assumed to be lost to earthquake; for partially damaged units, 35% is assumed lost.
- Furniture costs include basic bedroom with bed, wardrobe, and a small table plus living room sofa, tables and buffet. These are assumed at Rp 4,320,000 with similar loss distribution as above.
- Clothing and food-stock losses are assumed at Rp 333,000 with similar loss distribution as above.
- Temporary shelter set-up material and labor plus salvaging of material is assumed at Rp 225,000.
- Rehabilitation/repair cost is estimated at 50 % of the rebuilding cost, or Rp 500,000 m2.

[1] Exchange Rate 1 US$ = Rp 9,300.-

Table A.1: Housing Damage and Loss Summary

Districts	Physical Impact								Impact Valuation				
	Housing Stock 2003	Totally Destroyed	Heavily Damaged	Lightly Damaged	Totally Destroyed Adjusted	Damaged Adjusted	% Housing Stock Destroyed	% Housing Stock Damaged	Rebuilding Cost for Totally Destroyed Units (Rp million)	Losses for Totally Destroyed Units (Rp million)	Rebuilding Cost for Damaged Units (Rp million)	Losses for Damaged Units (Rp Million)	Overall Total of All Damage & Losses (Rp million)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
Bantul	181,991	26,045	29,582	24,262	46,753	33,137	25.69	18.21	2,524,639	243,140	894,694	100,526	3,762,999
Klaten	280,513	27,270	55,112	84,283	65,849	100,817	23.47	35.94	3,555,829	342,450	2,722,057	305,844	6,926,180
Gn. Kidul	158,570	11,323	5,355	16,360	15,071	17,967	9.50	11.33	813,856	78,380	485,101	54,505	1,431,841
Sleman	196,965	4,719	14,403	29,910	14,801	34,231	7.51	17.38	799,232	76,971	924,224	103,844	1,904,271
Yogya	78,079	1,948	4,119	2,355	4,831	3,591	6.19	4.60	260,880	25,124	96,959	10,894	393,858
Kln. Progo	87,940	3,485	4,726	7,999	6,793	9,417	7.72	10.71	366,818	35,327	254,258	28,568	684,971
Sukhoharjo	214,463	46	1,627	-	1,185	488	0.55	0.23	63,987	6,162	13,180	1,481	84,810
Wonogiri	261,044	15	11	67	23	70	0.01	0.03	1,234	119	1,886	212	3,451
Boyolali	219,537	276	626	637	715	825	0.33	0.38	38,598	3,717	22,278	2,503	67,097
Magelang	260,391	179	456	592	499	729	0.19	0.28	26,920	2,593	19,685	2,212	51,409
Purworejo	177,882	9	193	702	144	760	0.08	0.43	7,766	748	20,514	2,305	31,333
Totals	**2,117,375**	**75,315**	**116,211**	**167,168**	**156,662**	**202,031**	**7.40%**	**9.54%**	**8,459,758**	**814,731**	**5,454,837**	**612,893**	**15,342,220**

Notes

[1] Source: National Census Data (Podes 2003)
[2] [3] [4] Media Center Report Yogyakarta, June 7, 2006
[5] Assumes 70% of heavily damaged units will need to be demolished and rebuilt.
[6] Assumes 30% of heavily damaged units can be rehabilitated and/or repaired.
[7] Is the ratio of column [5] to [1].
[8] Is the ratio of [6] to [1].
[9] Assumes average house size of 54 m2. and Rp 54 million/house reconstruction cost.
[10] Assumes 60 % of pre-earthquake assets (appliances, kitchen utensils, clothing, furniture, and foodstuffs) and temporary shelter costs lost.
[11] Assumes average house size of 54 m2 and Rp 27 million/house repair cost.
[12] Assumes 35 % of pre-earthquake assets (appliances, kitchen utensils, clothing, furniture, and foodstuffs) and temporary shelter costs lost.

Infrastructure

TRANSPORT AND TELECOMMUNICATION

Roads, Railways, Aviation and Telecommunication

Data

The estimates for roads damage (National, Provincial, District) in Yogyakarta Province were prepared by the Public Works Agency/Kimpraswil DI Yogya and agreed upon at a meeting in the Bappeda Yogyakarta Province Office on evening of Tuesday, June 6, 2006. Detailed costing information and extensive supporting photos were also provided. The estimates for road damage in Central Java were prepared by Public Works Agency /Kimpraswil Central Java and provided to Bappeda Yogyakarta Province on Wed, June 7. These data sets were used to prepare the main and supporting tables of this report.

For railways, damage cost estimates were provided by Directorate General of Rails and PT KAI Operating Region VI on June 6 and 7, 2006.

For the aviation sector, data were provided by PT Angkasa Pura I / Directorate General of Civil Aviation on June 7, 2006.

For the telecommunications, the initial provision for an amount of Rp 7 billion was made by the assessment team on the basis of a report on post and telecom sector damage prepared by the Ministry of Communications and Information Technology, which did not contain a cost estimate.

Assumptions

The cost estimates were prepared based on inspections of individual damage locations and standard unit costs used by the public works agencies.

Table A.2: Damage and Losses in Road Sector

Item	Impact Valuation			
	Direct Damage (Rp Billion)			
	Total	Rehabilitation	Reconstruction	Losses
ROADS	**44.975**	**37.3**	**7.645**	**Negligible**
Roads in Yogyakarta Province	**37.033**	**29.388**	**7.645**	
National Roads	2.609	2.609	0	
Provincial Roads	9.824	9.824	0	
District Roads	2.201	2.201	0	
National Bridges	4.773	4.773	0	
Provincial Bridges	5.056	5.056	0	
District Bridges	12.569	4.924	7.645	
Roads in Central Java	**7.942**	**7.942**	0	
National Roads	0	0	0	
Provincial Roads	0	0	0	
Local Roads (Kab. Roads)	4.025	4.025	0	
National Bridges	0	0	0	
Provincial Bridges	2.717	2.717	0	
District Bridges	0	1.2	0	

Table A.3. Summary of Damage and Losses in Railway Sector

Item	**Valuation (Rp Million)**		
	Damage & Losses		
	Total	**Damages**	**Losses**
Track			
Srowot-Branbanan Section	4,795	4,795	0
Maguwo-Lempuyangan Section	398	398	0
Wates-Sentolo Section	5,970	5,970	0
Electrical (Electricity, Signal, Telecom)			
Srowoto-Branbanan Station	750	750	0
Civil (Bridge)	2,100	2,100	0
Building			
Station Buildings (12station)	1,175	1,175	0
Other Buildings	3,682	3,682	0
Supporting Facilities (Concrete Fence)	1,064	1,064	0
Total	19,934	19,934	0

Table A.4. Summary of Damage and Losses in Aviation Sector

Item	Valuation (Rp. Million)		
	Damage & Losses		
	Total	Damages	Losses
Airport Infrastructure	0	0	0
Airside Facilities			
Runway Leveling	12,000	12,000	0
Runway Crack Repair	300	300	0
Operation Road/Bridge	250	250	0
NAV/COM/AFL Equipment	360	360	0
Landside Facilities			
Departure Terminal	5,440	5,440	0
Control Tower	40	40	0
Checking Building	100	100	0
Other Facilities	285	285	0
Airport Revenue Losses			
Passenger Service Charge (PSC)	85	0	85
Vehicle Parking Charge	1	0	1
Cargo Handling Charge	65	0	65
Total	18,926	18,775	151

Source: Estimates of Joint Assessment Team

ENERGY

Data

The data for damage estimates was presented by PLN in the June 2, 2006 Coordination Meeting. There were unconfirmed reports of some damage to six roadside gas stations. No further details were available.

The PLN Load Control Center (P3B) supplied detailed cost estimate for substation repairs on June 9, 2006. A detailed breakdown of distribution network and customer buildings damage repair cost estimate was also received from PLN HQ. There is no updated estimate of PLN's losses resulting from increased power generation costs. The Head of P3B has provided indicative energy costs for coal and oil fired generation of Rp200 and Rp1800/kWH respectively but MWH sales estimates have not yet been obtained.

Revised estimate of the transmission substation loss should be made on the basis of normal and 'disaster' load flow information and the indicative unit energy costs for coal and oil-fired turbine plants.

WATER AND SANITATION

Data

Information was gathered from the Ministry of Public Works (MPW), the local PDAMs, the Association of Indonesian Water Supply Enterprises (PERPAMSI), Asian Development Bank, World Bank, UNICEF, and other donor and aid agencies supporting the relief effort. Very limited information was available on rural water supply, especially on the physical damages and impacts of the earthquake disaster. The assessment team conducted site visits to inspect in particular rural damage.

Assumptions

PDAM Damage: Data on existing assets (capacity of production unit, water tankers, pipe network, and connections) are incomplete. Damage to office buildings covered under other sectors (housing). Unit costs are based on MPW standards, complemented by assumptions made by the assessment team.

PDAM Losses: The calculation of potential losses for PDAMs is based on very preliminary information and incomplete data. It is assumed that 20% of revenue is lost for the first 6 months; revenues would return to pre-disaster level after 12 months. The same would apply to additional operating cost resulting from additional cost for fuel and chemical, and staff overtime. Additional cost for mobile treatment plants operated by aid agencies and army are not included due to lack of data.

Rural Water Supply: Cost for on-site sanitation (septic tanks, pit latrines) in urban and rural areas have been accounted separately under the Housing Sector analysis. Unit costs are based on assumptions made by the assessment team.

Individual water supply is assumed to be consisting of mostly shallow dug well. PODES data was used to estimate percent of villages with well. A preliminary field survey conducted by the assessment team suggested that 80% of the wells were filled with debris and needs cleaning and 20% suffered medium damage. The cost of rehabilitating damaged wells was assumed to be 50% of the total cost of a well. To estimate cost of cleaning, 4 person days of labor cost, amounting to 10% of the total cost of well was assumed in the analysis. The total number of wells affected was estimated based on the number of houses destroyed as assessed by the housing assessment team.

Urban sanitation: Information on damage to urban sanitation and solid waste management is very sparse. Damage assessment for urban sanitation in Yogyakarta is limited to secondary information obtained from government agencies such as Joint Secretariat of Kartamantul, and provincial Public Works office. Community sanitation facilities (MCK) are not included due to lack of data. Damage to office buildings are covered under other sectors (housing). Cost for on-site sanitation (septic tanks, pit latrines) in urban and rural areas will be covered under housing. Unit costs are based on assumptions made by the water and sanitation assessment team.

Table A.5: Damages in PDAM Water Supply (Rp million)

	Production capacity, L/s					Water tank truck					Piped network, km incl. connections					
District/Kota	**Before**	**Level of damage (%)**	**After**	**Unit cost per L/s**	**Cost of damage**	**Before**	**Level of damage (%)**	**After**	**Cost per unit**	**Cost of damage**	**Before**	**Level of damage (%)**	**After**	**Cost per km**	**Cost of damage**	**Total cost of damage**
Central Java Province	**0**	**0**	**0**	**75**	**0**											
Purworejo	0	0	0	75	0											
Magelang	0	0	0	75	0											
Boyolali	0	0	0	75	0											
Klaten	296.5	0	296.5	75	0											
Kota Magelang	0	0	0	75	0											
Yogyakarta Province	**1,674**		**1,877**		**1,786**	**16**		**16**		**0**	**840**		**812**		**3,220**	
Affected area only	1,099		1,005													
Kulon Progo	130	0	130	19	0	2	0%	2	200	0	0	0%	0	115	0	0
Kab. Bantul	235	40	141	19	1,786	3	0%	3	200	0	40	30%	28	115	1,380	3,166
Gunung Kidul	446	0	446	19	0	4	0%	4	200	0	0	0%	0	115	0	0
Sleman	281	0	281	19	0	2	0%	2	200	0	0	0%	0	115	0	0
Yogyakarta	583	0	583	19	0	5	0%	5	200	0	800	2%	784	115	1,840	1,840

Note: Unit cost of production is based on average investment cost of wells in PDAMs

Table A.6: Losses in PDAM Water Supply

Item	**0-6 months (Rp million)**	**6-12 months (Rp million)**	**Total (Rp million)**
Lost revenue	1,640	820	2,460
Additional operating cost	820	410	1,230
TOTAL	**2,460**	**1,230**	**3,690**
Assumptions:			
Item	**unit**		
Water produced	l/s	1,099	
Non-revenue water	%	40%	
Water produced	cm / month	2,847,312	
Water sold	cm / month	1,708,387	
Average tariff	Rp / cm	800	
Additional operating cost	Rp / cm	400	
Lost revenue 0-6 months	%	20%	
Lost revenue 6-12 months	%	10%	
Addit. oper. cost 0-6 months	%	20%	
Addit. oper. cost 6-12 months	%	10%	

Table A.7: Damage Assessment Rural Water Supply

Item	**Total (units)**	**Cost of damage (Rp million)**
Dug wells requiring cleaning	139,778	33,547
Dug wells requiring rehabilitation	34,945	41,933
TOTAL	**174,723**	**75,480**

Assumptions:	**Cost per unit**		
Item	**New well (Rp million)**	**Well cleaning (% of new)**	**Well rehabilitation (% of new)**
Dug wells	2.4	10%	50%
*Assuming medium damage to be 50% of total			
*Assuming 4 person days to clean = 240k rp so 10% of total cost			

Assumptions

**Assumed that total dug wells affected are equivalent to total number of houses totally damaged*

	No of houses damaged (from the table below)	No of dug wells (from the table below)	No of dug wells with debris (need cleaning)	No of dug wells need rehabilitation
Central Java Province		**79,682**	**63,746**	**15,936**
Purworejo		180	144	36
Magelang District		229	183	46
Boyolali		413	330	83
Klaten		77,561	62,049	15,512
Magelang City		-	-	-
Sukoharjo District		1,281	1,025	256
Wonogiri District		18	15	4
Yogyakarta Province		**95,041**	**76,033**	**19,008**
Kulon Progo		6,845	5,476	1,369
Bantul District		57,281	45,825	11,456
Gunung Kidul		9,269	7,415	1,854
Sleman		16,998	13,599	3,400
Yogyakarta		4,648	3,718	930
TOTAL		**174,723**	**139,778**	**34,945**

Data on damaged houses (from the Housing Sector)

	Totally destroyed Adj.	Damaged Adj.	Total weighted	No of villages*	no of village with well*	% of people using well	No of existing wells
Yogyakarta Province				438	313	**71%**	**95,041**
Bantul	46,753	29,582	**60,508**	75	71	**95%**	**57,281**
Sleman	14,801	14,403	**21,498**	86	68	**79%**	**16,998**
Yogyakarta City	4,831	4,119	**6,747**	45	31	**69%**	**4,648**
Kulon Progo	6,793	4,726	**8,990**	88	67	**76%**	**6,845**
Gn. Kidul	15,071	5,355	**17,561**	144	76	**53%**	**9,269**
Central Java Province	**68,414**	**58,026**	**95,012**	1,532	1,017	**66%**	**79,682**
Klaten	65,849	55,112	**91,476**	401	340	**85%**	**77,561**
Magelang	499	456	**711**	370	119	**32%**	**229**
Boyolali	715	626	**623**	267	177	**66%**	**413**
Sukoharjo	1,185	1,627	**1,942**	-		**66%**	**1,281**
Wonogiri	23	11	**28**	-		**66%**	**18**
Purworejo	144	193	**233**	494	381	**77%**	**180**
Total	**68,414**	**58,026**	**95,012**	1,532	1,017	**66%**	**79,682**

*Note:*data from Podes 2005.*

Table A.8: Damage Assessment Urban Sanitation (Rp million)

	Wastewater Treatment Plant (IPAL)					Sewer line and connections					Vacuum Truck					
	Before	Level of damage (%)	After	Cost per unit	Cost of damage	Before (m)	Level of damage (%)	After (m)	Cost per m	Cost of damage	Before	Level of damage (%)	After	Cost per unit	Cost of damage	Total Cost of damage
Yogyakarta Province	**1**		**0.97**		**1,422**	**130,537**		**130,537**		**-**	**0**	**0**	**0**	**250**	**0**	**1,422**
Kulon Progo	none				0	none				0	none	0			0	0
Bantul	1	3	1	47,413	1,422	10,092	0	10,092	896	-	2	0	2	250	0	1,422
Gunung Kidul	none				0	none				-	none	0			0	0
Sleman	none				0	6,750	0	6,750	97,185	-	none	0			0	0
Yogyakarta City	none				0	113,695	0	113,695	147,139	-	12	0	12	250	0	0

Note:
Assessment on damage in urban sanitation is based on the following information :
sewerage scheme exists in Yogyakarta, part of Kab Bantul and part of Kab Sleman.
communal (CBS) schemes exist in Yogyakarta
IPLT (sludge treatment plant) does not exist in any city outside Yogyakarta
No information available regarding level of damage to sewer line in Yogyakarta
No urban sanitation damage reported in Central Java Province
Source: Yogyakarta Urban Infrastructure Management Support and Kimpraswil provincial office

Social Sectors

EDUCATION

Assumptions:

TK/RA/Diniyah: 4 classrooms @ 48m2 + 1 service room@ 48m2

SD/MI: average 25 students/classroom, number of classroom/school = 6.26

1 classroom = 56m2; plus 3 service rooms

SMP/MTs : 30 students/classrooms, number of classrooms/school =10.7

1 classroom = 63m2; plus service rooms & labs

SMA/MA/SMK: 35 students/classroom; no. of classrooms/school = 10.3126984

1 classroom = 72m2

SLB: 150 - 200 m2

Tertiary education: information from interview, rough estimate

Kantor Cabang Dinas = 200 m2/unit (info from Dinas Kab & Prov)

Unit cost for rebuilding = Rp 1,800,000/m2; Weighting factor Destroyed = 1.0; Severe = 0.65; Minor = 0.2. Based on information from World Bank Engineering Team (Pak Anto + Pak Atmaji)

Computer lab: 20 unit per school for SMP/MTs; and 30 units for SMA/MA/SMK

SMP/MT	160000	Rp/school
SMA/MA	240000	Rp/school
PT	240000	

Furniture = destroyed school 50% furniture damaged; 1 set desk & chair per school:

TK/RA 6000

SD/MI	18750	Rp/school
SMP/MT	45000	Rp/school
SMA/MA	61250	Rp/school
SLB	8750	
PT	50000	

Temporary tents or space rental = Rp 15,000,000/100 m2, (or Rp 1500,000/m2) to be estimated 50% of building space

Costs of hiring & training new teacher/staff = Rp 5,000,000/person to replace dead personnel

Costs of paying temporary teachers to replace heavily injured = Rp 1,500,000/person/month; for 3 months

Damaged of educational equipment (audio, lab equipment, teaching equipment, etc) is estimated

TK/RA 3000

SD/MI	5000	Rp/school

SMP/MT	15000	Rp/school
SMA/MA	25000	Rp/school
SLB	10000	
PT	30000	

Damaged of textbook & teaching materials

TK/RA		
SD/MI	5000	Rp/school
SMP/MT	10000	Rp/school
SMA/MA	15000	Rp/school
SLB	5000	
PT	20000	

Costs of counseling for students

To estimate public & private sector, pre-disaster data on number of classrooms were used

	Public (%)	Private (%)
TK	1.5	98.5
SD	82	18
SMP	67	33
SMA	54	46
SMK	38	62
SLB	20	80

Table A.9: Damages in Education Sector by School Type and Level

District/Kota	Type of school	Number of damaged buildings			
		Destroyed	Severe	Minor	Total
Central Java Province					
Damage Buildings	TK	2	10	16	28
	SLB	-	1	-	1
	SD	56	295	213	564
	SMP	2	28	21	51
	SMA	4	5	6	15
	SMK	-	7	2	9
	RA	-	-	-	-
	MI	1	7	7	15
	MTs	-	1	2	3
	MA	-	-	-	-
	PT	-	-	-	-
	Lembaga PAUD	2	6	-	8
	PKBM + TBM	3	8	1	12
	Lembaga Kursus	-	2	13	15
	Madrasah Diniyah	1	1	-	2
	Pondok Pesantren	2	-	3	5
	Gedung Diklat	4	3	-	7
	SKB	-	1	-	1
	Kantor Cabang Dinas	2	7	7	16
	Total Central Java	**79**	**382**	**291**	**752**
Yogyakarta Province					
Damaged Buildings	TK	96	145	72	313
	SLB	1	13	4	18
	SD/MI	511	389	362	1,262
	SMP/MTs	95	71	39	205
	SMA	37	19	18	74
	SMK	25	34	29	88
	RA	-	-	-	-
	MI	-	5	2	7
	MTs	-	1	-	1
	MA	-	-	-	-
	PT	1	13	40	54
	Lembaga PAUD	10	44	17	71
	PKBM + TBM	1	10	-	11
	Lembaga Kursus	-	-	-	-
	Madrasah Diniyah	-	-	-	-
	Pondok Pesantren	-	27	14	41
	Gedung Diklat	-	-	1	1
	SKB	-	3	-	3
	Kantor Cabang Dinas	-	5	1	6
	Total Yogyakarta Province	**777**	**779**	**599**	**2,155**
	TOTAL Yogyakarta and Central Java	**856**	**1,161**	**890**	**2,907**

Data Source:
1. Secretariat MONE Task Force (Posko Sekretariat Pusat Satgas Depdiknas)
2. Provincial Education Office of Central Java
3. Provincial Education Office of Yogyakarta

HEALTH

The damage assessment is based on comparison of 'Before' and 'After' data. 'Before' data for the number of health facilities are from BPS, Central Java Province 2004 Health Profile and Yogyakarta Province 2005 Health Profile.

'After' data for hospitals, health centers and health sub-centers were gathered by teams from the Ministry of Health (Balitbangkes), Central Java and Yogyakarta Province and Related District Health Offices, World Bank and Asian Development Bank. The survey was carried out between 29 May and 7 June 2006. The team visited all of the 6 districts in Yogyakarta and 5 districts in Central Java affected by the earthquake. In each district they collected information from health staff and other informants on the following variables at the relevant district and provincial levels:

Hospitals – public and private, general and specialized.
Health centers (Puskesmas)
Sub-health centers (Pustu)
Polindes
Maternity homes
Vehicles
Private and joint medical practices
Midwife practice
District health offices
Health staff quarters in Puskesmas/Pustu
Drug warehouses
Health laboratories
Training institutions
Health polytechnic institutions

Assumptions:
Losses were estimated as marginal costs of programs and activities over and above those which would have normally been incurred had there been no earthquake. The actual programs included are based on reports of current public health activities in the province.

Unit costs for both damages and losses were estimated using information from the Department of Health and experience in projects and sector work. The assumptions underlying the various estimates are listed in the relevant tables and reproduced below:

- Assume all temporary health clinics operating are granted by donors.
- Assume all private specialty hospitals public and private as private hospital 100 beds.
- This means that the number of facilities affected = total number of facilities * percent of district affected by earthquake, of these assume proportions destroyed, heavily damaged, and lightly damaged are equivalent to the damage to the modern housing stock (44% destroyed, 28% moderate damage, 28% light damage).
- Assume that minor reconstruction costs 12% of total reconstruction; major reconstruction costs 55% of total reconstruction.
- Public health costs are estimated over and above current spending for surveillance, vector control, immunization and nutrition campaigns, and other programs. Not yet calculated

- Private practices damage reports not available.
- Polyclinic costs are valued the same as Pustu costs.
- The damage costs for private practices are a simple average of the costs for doctor, nurse, and midwife practice, not yet calculated.
- The Rp/$ exchange rate = 9300Rp/$1, as per early June 2006.
- Assume 10% of drugs purchased by Ministry of Health is imported, assume 80% of replaced supply costs go to pharmaceuticals.
- Assume that 50% of equipment is imported.
- Updates original Jan 2005 cost estimates to May 2006 using BPS deflators.
- Drug and equipment costs still need to be updated for inflation.
- Health Staff Housing costs assumed to be same as Pustu costs.
- UPT costs assumed to be same as Puskesmas costs.
- Public health campaigns and trauma mitigation have not been calculated.

Table A.10 : Damage and Losses in Health Sector

	Square Meters (M2) private Damage	Public facilities hospitals	other	Public hospitals	Public health clinics	Public health sub-clinics	Other public and admin	Private hospitals	Other private facilities	Damage	Public health programs	Replacement personnel	Facility cleanup	Additional health treatment	Loss
Yogyakarta City	11405	8	29	79,289,050,436	7,162,772,276	1,289,663,323	12,993,624,951	388,791,126,192	114,873,282,784	604,399,519,962	0	1,236,761,225	1,284,118,957	4,899,493,216	7,420,373,397
Bantul	6838	1	144	9,911,131,305	35,566,869,230	6,403,845,465	64,520,068,724	233,104,228,049	68,873,608,740	418,379,751,514	0	741,514,534	769,908,411	2,937,547,971	4,448,970,915
Kulon Progo	205	0	12	0	2,963,905,769	533,653,789	5,376,672,394	6,988,354,307	2,064,798,156	17,927,384,415	0	22,230,254	23,081,489	88,066,296	133,378,040
Gunung Kidul	1763	1	110	9,911,131,305	27,169,136,218	4,891,826,397	49,286,163,609	60,099,847,039	17,757,264,143	169,115,368,710	0	191,180,188	198,500,808	757,370,148	1,147,051,144
Sleman	2285	4	78	39,644,525,218	19,265,387,500	3,468,749,627	34,948,370,559	77,894,583,371	23,014,945,301	198,236,561,577	0	247,786,006	257,274,162	981,617,010	1,486,677,178
Yogyakarta Province	22496	14	373	138,755,838,263	92,128,070,993	16,587,738,601	167,124,900,238	766,878,138,957	226,583,899,125	1,408,058,586,177	0	2,439,472,207	2,532,883,827	9,664,094,641	14,636,450,674
Klaten		0	71	0	11,003,678,325	3,822,846,714	345,250,844	0	119,519,796	15,291,295,678	0	321,634,748	80,903,760	0	402,538,508
Central Java Province		2	98												

Table A.11: Summary of Damage and Losses for Health Sector in Yogyakarta Province

Item	Damage	Loss
Total	**1,408,058,586,177**	**14,636,450,674**
Public hospitals	138,755,838,263	
Public health clinics	92,128,070,993	
Public health sub-clinics	16,587,738,601	
Other public and admin	167,124,900,238	
Private hospitals	766,878,138,957	
Other private facilities	226,583,899,125	
Public health programs		0
Replacement personnel		2,439,472,207
Facility cleanup		2,532,883,827
Additional health treatment		9,664,094,641

Table A.12: Summary of Damage and Losses for Health Sector in Central Java Province

Item	Damage	Loss
Total	**117,260,530,753**	**6,406,845,005**
Public hospitals	95,691,306,523	
Public health clinics	15,188,175,716	
Public health sub-clinics	5,276,605,324	
Other public and admin	476,543,418	
Private hospitals	0	
Other private facilities	627,899,772	
Public health programs		0
Replacement personnel		1,689,714,944
Facility cleanup		425,029,613
Additional health treatment		4,292,100,448

Distribution of Damage between Public and Private Sector Facilities:

For Yogyakarta Province:
(i) Damage to private sector facilities was equivalent to percent of M2 damaged by district for private facilities and (ii) damage to public sector facilities was equivalent to the proportion of hospitals damaged by district for hospitals and non hospital facilities for everything else.

For Klaten district:
Damage to Klaten facilities was the proportion of hospitals damaged by district for hospitals and non hospital facilities for everything else.

SOCIAL PROTECTION

Assumptions:
Three public facilities affected in Yogyakarta City are training centers for social workers and coordination office.
Damage cost calculated from cost of housing/building reconstruction per m2 plus the cost of supporting equipment in it.
Assume replacement cost of the facility similar to the cost for reconstruction of a house with unit cost at Rp 1.6 million/m2.
This is a rough estimation provided by a contractor who works for Yogyakarta provincial social affairs office together with the office's staff.
Assume that the cost for major damage is a t 65% and minor damage at 20% from cost of reconstruction for a house with its supporting equipment.
Assume the clean up cost at Rp 5,000/m2 for destroyed building.
Assume that clean-up costs for minor damage is at 20% and for major damage at 65% from clean-up cost of a destroyed building.
Damages to Taman Makam Pahlawan(TMP) or Hero cemetery, is reported by the Klaten's social affair office but not calculated and included in the damage assessment.

Table A.13: Damage and Losses in Social Protection Sector by Districts (Rp Million)

	Damage	Losses	Total	Private Total	Public Total	Private	Public
Yogyakarta Province	35,418.33	85.07	35,503	26,131	9,373	51	16
Yogyakarta City	9,365.55	7.68	9,373	7,142	2,232	16	5
Gunung Kidul	5,020.98	2.87	5,024	3,768	1,256	6	2
Kulon Progo	2,580.99	1.36	2,582	2,582	0	4	0
Bantul	4,419.15	64.51	4,484	3,139	1,345	7	3
Sleman	11,602.95	8.65	11,612	9,500	2,111	18	4
Soc. worker training facility	2,428.71		2,429	-	2,429		2
Central Java Province			-				
Klaten	8,084.07	4.27	8,088	7,414	674	11	1
Grand total	**43,502**	**89.34**	**43,592**	**33,545**	**10,047**	**62**	**17**

CULTURE AND RELIGION

Table A.14: Damage Assessment for Places of Worship

Number of Places of Worship (Before the Earthquake)

Name of District/City	Mosque	Prayer House (Surau/Langgar)	Church Protestant	Church Catholic	Pura (Hindu)	Vihara (Buddhist)	Total
Klaten District	2,396	1,827	132	52	56	7	4,470
Kulon Progo District	957	956	38	53	0	5	2,009
Bantul District	1,457	1,566	32	23	4	0	3,082
Gunung Kidul District	1,635	701	97	34	10	4	2,481
Sleman District	1,801	1,328	65	55	5	3	3,257
Yogyakarta City	393	284	42	12	0	10	741
Total	8,639	6,662	406	229	75	29	16,040

Damage assessment based on reported damage to Junior Secondary Schools in the districts as of 6 June 2006: 21:30

Baseline number of Junior Secondary Schools from Podes 2005

This includes public and private schools under the Ministry of National Education and Ministry of Religious Affairs

Proportion damage facilities	Destroyed	Heavy	Minor
Klaten District	0.72%	14.49%	1.45%
Kulon Progo District	0.00%	4.92%	6.56%
Bantul District	85.19%	14.81%	0.00%
Gunung Kidul District	3.33%	18.33%	19.17%
Sleman District	0.00%	13.11%	0.00%
Yogyakarta City	3.57%	10.71%	1.79%

Assumptions of rehabilitation costs:	Mosque	Prayer House (Surau/Langgar)	Church Protestant	Church Catholic	Pura (Hindu Temple)	Vihara (Buddhist Temple)
Assumed facility size (M2)	200	100	200	200	200	200
Assumed cost/M2 by type of damage						
- Destroyed	1,000,000	800,000	1,000,000	1,000,000	1,000,000	1,000,000
- Heavy damage	600,000	400,000	600,000	600,000	600,000	600,000
- Minor damage	300,000	200,000	300,000	300,000	300,000	300,000

The number of existing facilities is multiplied by the proportion of facilities damaged, by the assumed size, and by the reconstruction cost

Table A.15: Damage Assessment for Places of Worships in Yogyakarta Province (Rp million)

	Mosque	Prayer House (Surau/Langgar)	Church Protestant	Church Catholic	Pura (Hindu Temple)	Vihara (Buddhist Temple)	**Total**
Pre-Disaster Data (Number of Buildings)	6243	4835	274	177	19	22	**11570**
Mild Damage	22980	4040	1320	600	120	60	**29120**
Severe Damage	100920	24480	4680	2400	480	240	**133200**
Destroyed	262000	109360	6400	4200	600	0	**382560**
Total	385900	137880	12400	7200	1200	300	**556450**

Table A.16: Damage Assessment for Places of Worships in Central Java (Rp million)

	Mosque	Prayer House (Surau/Langgar)	Church Protestant	Church Catholic	Pura (Hindu Temple)	Vihara (Buddhist Temple)	**Total**
Pre-Disaster Data (Number of Buildings)	2396	1827	132	52	56	7	**4470**
Mild Damage	2100	520	120	60	60	0	**2860**
Severe Damage	41640	10600	2280	960	960	120	**56560**
Destroyed	3400	1040	200	0	0	0	**4640**
Total	47140	12160	2600	1020	1020	120	**52490**

Productive Sectors

AGRICULTURE, LIVESTOCK AND FISHERIES

Detailed description of assumptions can be found in the main text.

TRADE

Table A.17: Contribution to GRDP, Yogyakarta Province, 2000-2003

District	2000	%	2001	%	2002	%	2003	%
Bantul								
Trade, Hotel and Restaurant	385,772	17.1	427,972	17.1	475,791	17.1	533,481	17.3
Trade and Restaurant	380,267	16.8	421,772	16.8	469,396	16.9	526,327	17.1
Trade	182,145	8.1	202,189	8.1	224,937	8.1	252,153	8.2
Hotel	5,505	0.2	6,200	0.3	6,395	0.2	7,154	0.2
Restaurant	198,122	8.8	219,583	8.8	244,459	8.8	274,174	8.9
Yogyakarta								
Trade, Hotel and Restaurant	796,074	23.8	912,551	23.9	1,050,965	24.0	1,194,180	24.4
Trade and Restaurant	687,083	20.5	789,272	20.7	905,713	20.7	1,027,035	21.0
Trade	196,085	5.9	228,206	6.0	260,966	6.0	301,008	6.2
Hotel	108,991	3.3	123,279	3.2	145,252	3.3	167,145	3.4
Restaurant	490,998	14.7	561,066	14.7	644,747	14.7	726,027	14.6

Table A.18: Contribution to GRDP, Central Java Province, 2000-2003

District	2000	%	2001	%	2002	%	2003	%
Klaten								
Trade, Hotel and Restaurant	772,019	26.2	878,585	26.2	1,009,835	25.9	1,100,308	25.7
Trade and Restaurant	768,451	26.1	873,697	26.1	1,003,172	25.8	1,093,171	25.5
Trade	538,219	18.3	622,175	18.6	731,348	18.8	800,338	18.7
Hotel	3,568	0.1	4,887	0.2	6,662	0.2	7,137	0.2
Restaurant	230,231	7.8	251,521	7.5	271,823	6.9	292,832	6.8

Table A.19: Markets in Yogyakarta and Parts of Central Java Provinces, 2005

District	Villages with Stores	Villages with Permanent and Semi Permanent Buildings	Markets without Permanent Buildings	Supermarket	Restaurant
	Villages	Villages	Unit	Unit	Unit
Magelang	42	65	39	10	95
Boyolali	65	80	30	24	116
Klaten	97	84	46	44	373
Kote Magelang	10	8	7	6	31
Kulon Progo	24	42	13	12	40
Bantul	41	40	7	71	23
Gunung Kidul	35	73	31	18	119
Sleman	63	57	9	143	509
Yogyakarta	35	25	15	62	331

Source: PODES 2005

Table A.20: Numbers of Modern and Traditional Markets in Yogyakarta Province, 2003 - 2005

District	2003			2004			2005		
	Traditional	Modern	Franchise	Traditional	Modern	Franchise	Traditional	Modern	Franchise
Bantul	44	6		47	12		30	12	
Sleman	51	47		36	57		36	53	
Kulon Progo	34	4		36	10		36	10	
Gunung Kidul	37	7		36	9		28	8	
Yogyakarta	31	36	26	37	57	26	31	50	26
Total	**197**	**100**	**26**	**192**	**145**	**26**	**161**	**133**	**26**

Source: Dinas Deperindagkop, Yogyakarta, 2006

Table A.21: Licensed (SIUP) Traders in Yogyakarta Province, 2002-2005

Classification	2002	2003	2004	2005
Large	184	230	350	369
Medium	418	521	614	737
Small	23,397	24,631	25,633	26,969
Total	**23,999**	**25,382**	**26,597**	**28,075**

Source: Dinas Deperindagkop, Yogyakarta, 2006

Table A.22: Estimated Damage & Losses Markets

A. Traditional Market

NO.	LOCATION	Lost trade (adjusted)	Damage to buildings and other assets	Total
YOGYAKARTA				
I	**Bantul**	**29,400**	**76,577**	**105,977**
	1. Pasar Niten *	8,400	12,171	20,571
	2. Pasar Imogiri *	8,400	21,906	30,306
	3. Pasar Plered *	4,200	22,500	26,700
	4. Pasar Piungan *	8,400	20,000	28,400
II	**Sleman**	**7,320**	**906**	**8,226**
	Kec. Godean	1,600	5	1,605
		800	17	817
	Kec. Prambanan	1,000	36	1,036
	Kec. Tegal Sari	480	13	493
		100	102	202
		400	184	584
	Kec. Tempel	400	102	502
		600	26	626
		900	183	1,083
	Kec. Gamping	840	179	1,019
	Kec. Condongcatur	100	9	109
		100	50	150
III	**Yogyakarta City**	**10,500**	**52,235**	**62,735**
	1. Pasar Bringharjo *	6,000	47,944	53,944
	2. Pasar Kranggal	1,000	150	1,150
	3. Pasar Giwangan	600	231	831
	4. Pasar Sentul	500	225	725
	5. Pasar Gading	100	1,026	1,126
	6. Pasar Prawirotaman	350	90	440
	7. Pasar Ciptomulyo	100	334	434
	8. Pasar Karangkajen	150	1,094	1,244
	9. Pasar Serangan	800	463	1,263

	10. Pasar Patuk	100	9	109
	11. Pasar Kotagede	300	82	382
	12. Pasar Tunjungsari	400	557	957
	13. Pasar Demangan	100	30	130
IV	**Gunung Kidul**	**11,259**	**19,657**	**30,916**
	Kec. Wonosari	9,250	17,702	26,952
	Kec. Nglipar	63	11	74
		356	17	373
	Kec. Ngawen	184	557	741
		29	557	586
		348	49	397
	Kec. Saptosari	131	50	181
	Kec. Panggang	110	46	156
	Kec. Purwosari	281	134	415
	Kec. Playen	104	33	137
	Kec. Gedangsari	203	223	426
	Kec. Paliyan	200	278	478
		30	450	480
V	**Kulon Progo District**	**1,869**	**500**	**2,369**
	1. Pasar Dekso **	311	200	511
	2. Pasar Brosot **	311	50	361
	3. Pasar Kranggan **	311	50	361
	4. Pasar Sewugalur **	311	50	361
	5. Pasar Kasihan **	311	50	361
	6. Pasar Kenteng **	311	100	411
Central Java Province				
VI	**Klaten District**	**19,488**	**15,153**	**34,641**
	1. Pasar Taji *	1,188	2,534	3,722
	2. Pasar Prambanan *	2,400	1,229	3,629
	3. Pasar Wedi *	2,100	5,932	8,032
	4. Pasar Gempol *	2,100	1,280	3,380
	5. Pasar Gantiwarno *	2,550	390	2,940
	6. Pasar Panggil *	2,100	1,121	3,221
	7. Pasar Masaran *	1,050	779	1,829
	8. Pasar Temuwangi *	2,100	612	2,712
	9. Pasar Sidoharo *	2,100	979	3,079
	10. Pasar Minggiran *	1,800	297	2,097
	Total	**79,836**	**165,028**	**244,864**

Notes/Assumption:

Loss Trade is calculated based on daily sales volume data from Ministry of Trade and Provincial Office of Trade, Industry, and Cooperatives Data

** Market buildings that are 100% damaged, hence lost trade are calculated for 30 days until they reopen*

*** Lost trade is calculated for one day (weekly markets),lost trade in other markets is calculated for four days*

Damage to buildings based on Ministry of Trade actual data

B. Modern Market (Fixed Price – Rp millions)

Location	**Lost trade** (adjusted)	**Damage to buildings and other assets**	**Total** (Adjusted)
Bantul District		0	
Sleman District		0	
Yogyakarta City	10,000	1,000 (estimate)	11,000
	10,000	1,000 (estimate)	11,000
	150	150	300
	NA	0	
	NA	20	20
	NA	20	800
		800	800
Gunung Kidul District	NA	0	
Kulon Progo District	NA	0	
Klaten District	215	540	755
Total	20,365	3,530	24,675

Notes
NA = Information not available
**) - The stocks are not damaged, some of it was donated to the victims.*
- Closed pending building inspection
- recently open (3-4 months).
***) No interruption*
Source : Min of Trade and Provincial Office of Trade, Industry, and Cooperatives Data

INDUSTRY AND ENTERPRISES

Table A.23: Micro Small and Medium Enterprises affected by the earthquake

	baseline	loss units in formal sector	informal sector loss	total loss units	workers in formal	members in informal	dependents in formal	total affected
Bantul District	21,306	9,588	5,040	14,628	335,570	20,160	1,342,278	1,362,438
Klaten District		4,500	3,360	7,860	157,500	13,440	630,000	643,440
Yogyakarta City	8,619	776	1,680	2,456	27,150	6,720	108,599	115,319
Sleman District	18,558	1,113	1,120	2,233	38,972	4,480	155,887	160,367
Gunung Kidul District	21,659	650	560	1,210	22,742	2,240	90,968	93,208
Kulon Progo District	22,418	673	560	1,233	23,539	2,240	94,156	96,396
Total	**92,560**	**17,299**	**12,320**	**29,619**	**605,472**	**49,280**	**2,421,888**	**2,471,168**
	(Yogyakarta only)							

Data: baseline data is from Bank Indonesia survey with University of Gajah Mada PSE-KP, 2003
estimate growth rate of 2% per year, so 6% from 2003 to 2006 baseline figures
no baseline for Klaten in this survey, data was quoted from UGM economist, Sri Adiningsih
main economy structure: 25% furniture, 25% handicraft, 20% textile, 30% others
dependents and affected refer to family members, assumed family of 4

Assumptions:	formal sector
Bantul District	50% in affected industries, 90% destroyed
Klaten District	see above
Yogyakarta City	30% in affected industries, 30% destroyed
Sleman District	30% in affected industries, 20% destroyed
Gunung Kidul District	30% in affected industries, 10% destroyed
Kulon Progo District	30% in affected industries, 10% destroyed

Informal sector

- Baseline of 79,000 (for Yogyakarta) is from Bank Indonesia last known survey in 2001 as informed by APIKRI - small handicraft associations
- The figure includes farmers, with a proportion of 50%, hence assume 40,000 micro-enterprises
- No info on geographical distribution, assume proportionate distribution of 8,000 each, no info on Klaten, assume the same
- Assume 70% in affected industries as most micro act as supporting industries, with same level of destruction as in formal sector for each region
- Cross checking with banking sector info, the loss units assumption should be about right (or even slightly on the low side) given that banks estimate potential NPLs from 37,482 debtors and the BPRs estimate 21,008 debtors
- Total expected bad debtors in Yogyakarta alone are 58,490. some debtors may have multiple loans from different banks

Workers

- Average workers in formal

- 50% have 50 workers
- 50% have 20 workers
- The range is between 5 to 500
- An enterprise may have only 20 permanent workers, but up to 140 temporary workers
- Informal enterprises have 4 members
- Proportion: 60% small, 40% medium enterprises, micro equals with informal sector

Estimates of Damage and Losses in Industry and Enterprises Sector

	medium	**small**	**micro**
Bantul District	3,835	5,753	5,040
Klaten District	1,800	2,700	3,360
Yogyakarta City	310	465	1,680
Sleman District	445	668	1,120
Gunung Kidul District	260	390	560
Kulon Progo District	269	404	560
total	**6,920**	**10,380**	**12,320**
assumptions per unit loss	**medium enterprise**	**small**	**micro**
building	200,000,000	100,000,000	20,000,000
inventory	100,000,000	50,000,000	none - mostly subcontract
salaries on going (6 months)	3,000,000	can't pay	can't pay
income per month	50,000,000	20,000,000	2,500,000
based on data gathered from the survey			
average total loss	**medium enterprise**	**small**	**micro**
building	1,383,936,000,000	1,037,952,000,000	246,400,000,000
inventory	691,968,000,000	518,976,000,000	
salaries on going (6 months cost)	1,037,952,000,000	Na	na
potential earnings loss	2,075,904,000,000	622,771,200,000	92,400,000,000
(6 months for medium and 3 months for micro and small enterprises)			
Total Estimated Losses	**5,189,760,000,000**	**2,179,699,200,000**	**338,800,000,000**
average total loss = loss unit X per unit loss			

Reported loss from large enterprises: only 3 companies reported damages to the Dinas - these are Sari Husada (food), PT. ASA (leather) and PT. Budi Makmur (leather)
PT ASA 5,700,000,000
PT Budi Makmur 3,000,000,000
PT Sari Husada in their press release reported damages to its 2 factories and inventories loss Rp 175 billion, plus Rp 70 billion of expected loss of earnings
The company is closed and expects to re-start production in 2 to 3 months time
Total damage and loss assessment for micro, small and large enterprises 7,961,959,200,000

TOURISM

Table A.24: Summary Damage and Loss Assessment Subsector Tourism in the Districts of Yogyakarta

ITEM	DAMAGE ASSESSMENT (Rp million)							LOSSES ASSESSMENT			
	number pre-disaster	LEVEL OF DAMAGE						number of non damages	Income/ month pre-disaster	income/ month post-disaster	assumption
		SEVERE DAMAGE		MODERATE DAMAGE		LIGHT DAMAGE					
		number	cost / unit	number	cost / unit	number	cost / unit				
1. Facilities	31	2	450	4	603	3	400	22	1,744	1,322	
Buildings		4		11		9					
Assets											
Employees											
Visitor											
2. Hotel	34	5	21.494	13	9,697	3	120	13	372	268	occupancy rate 52%
Buildings											
Assets											
Employees	275							220			
Visitor	800,000										
3. Motel/ Hoster/ Losmen/ Wisma	1,106	50	70	180	50	66	20	810	415	256	occupancy rate 50%
Buildings											
Assets											
Employees											
Visitor											
4. Kantor	12										
Buildings	12	2	350	3	285	2	105	5			
Assets											
Employees											
Visitor											

*Comments: facilities based on number of tourist objects; * Makam Raja in Imogiri is financed by donations (more a spiritual loss); *damages of Prambanan alone are 1.760 mio Rp. *The losses of Prambanan alone are 1.151 mio Rp. per month calculated on basis of 6 months*

Table A.25: Summary Damage and Loss Assessment Subsector Tourism in the Districts of Klaten/Jateng

ITEM	DAMAGE ASSESSMENT (Rp million)							LOSSES ASSESSMENT (Rp million)				COMMENTS
	number pre-disaster	LEVEL OF DAMAGE						number of non damages	Income /month pre-disaster	income/ month post-disaster	assumption	
		SEVERE DAMAGE		MODERATE DAMAGE		LIGHT DAMAGE						
		number	cost / unit	number	cost / unit	number	cost / unit					
1. Facilities	14	1	100	4	132			9	350	350	Income iand losses roughly calculated on the basis of district income (taxes, fees, etc.)	>Prambanan facilities in Klaten district amount to 1.070 mio Rp.
Buildings		2		10				9				>Prambanan losses on Yogya list; Note: the damage in the Most Severe case is one gate damaged (hence its value is smaller than the Moderate Damage)
Assets												
Employees												
Visitor	800,000							550,000			Visitor number of visitors is estimated to decline ca. 30% over the coming year	
2. Hotel												All the accomodation in Klaten district are non-star hotel
Buildings												
Assets												
Employees												
Visitor												
3. Motel/ Hoster/ Losmen/ Wisma	42	10	270	6	120			32	750	550	It is assumed that the occupancy rate declines by 30%	Panti pijat falls into this category
Buildings	42											
Assets												
Employees	275							220				
Visitor												
4. Kantor	4											
Buildings	4	1	500	2	100			1				inkind losses (no income because only information) because this institution provide information
Assets												
Employees												
Visitor												

Cross-Sectoral

GOVERNANCE AND ADMINISTRATION

Assumptions:

Damages to buildings:
Buildings without proper design (total/complete damage) 80-100%
Buildings poorly designed and built (medium to heavy damage) 30-80%
Buildings with sound design (slightly damaged but repairable) 0-30%
When reports were available, estimates of floor surface were made based on averages and otherwise extrapolated based on similar districts with similar intensity scale.
Official government unit costs per square meter are about Rp 1.0 million for slightly damaged buildings and Rp 1.0 million for heavy to totally damaged buildings.

Equipment and Furniture:
Estimates based on personnel numbers: Rp 3.0 million per civil servant at a 30% damage level. This includes damage to computers, vehicles, furniture (cabinets, tables and chairs).

Personnel:
Number of affected personnel estimated as a ratio of the general population (i.e. number of dead, missing, injured in proportion to the general population).
Costs based on (3 months) salary (Rp 2.0 million), recruiting and training and "downtime" during the relief-crisis stage

Documents:
Cost estimated at Rp 50,000 per record with 5 different records per household in the population. It is assumed that 10% of total records were damaged.

Contingency elements are added at the rate of 10% contingency.

Table A.26: Summary of Damage and Losses in the Governance Sector

	Pillar						
	Public administration	**Justice**	**Parliament**	**Police**	**Subtotal**	Contingency 10%	Total
Yogyakarta Province	-	**-**	800,000,000	600,000,000	1,400,000,000	**140,000,000**	1,540,000,000
Yogyakarta City	31,112,245,380	**471,397,657**	**157,132,552**	**1,080,024,410**	**32,820,800,000**	3,282,080,000	36,102,880,000
Bantul	1,861,722,457	**-**	**232,715,307**	**1,948,602,839**	4,043,040,603	404,304,060	**4,447,344,663**
Kulon Progo	362,752,242	**-**	310,930,493	250,817,265	924,500,000	92,450,000	**1,016,950,000**
Gunung Kidul	4,209,565,011	**-**	169,512,685	966,222,304	5,345,300,000	534,530,000	**5,879,830,000**
Sleman	440,425,605	**-**	377,507,661	425,325,298	1,243,258,564	124,325,856	**1,367,584,421**
Central Java Province	-	**-**	**150,000,000**	**25,000,000**	**175,000,000**	**17,500,000**	**192,500,000**
Klaten	68,055,161,544	**-**	153,277,391	1,889,399,305	70,097,838,240	7,009,783,824	**77,107,622,064**
Boyolali	665,563,995	**-**	313,206,586	352,879,420	1,331,650,000	133,165,000	**1,464,815,000**
Magelang	-	**-**	395,877,743	446,022,257	841,900,000	84,190,000	**926,090,000**
Wonogiri	6,293,750,000	**-**	-	-	6,293,750,000	629,375,000	**6,923,125,000**
Total	**113,001,186,234**	471,397,657	3,060,160,419	7,984,293,098	124,517,037,407	**12,451,703,741**	136,968,741,148

Building

	Pillar						
	Public administration	Justice	Parliament	Police	Subtotal	Contingency 10%	Total
Yogyakarta Province	-	-	**800,000,000**	**600,000,000**	**1,400,000,000**	**140,000,000**	**1,540,000,000**
Yogyakarta City	29,700,000,000	450,000,000	150,000,000	1,031,000,000	31,331,000,000	3,133,100,000	**34,464,100,000**
Bantul	1,200,000,000	-	150,000,000	1,256,000,000	2,606,000,000	260,600,000	**2,866,600,000**
Kulon Progo	175,000,000	-	150,000,000	121,000,000	446,000,000	44,600,000	**490,600,000**
Gunung Kidul	3,725,000,000	-	150,000,000	855,000,000	4,730,000,000	473,000,000	**5,203,000,000**
Sleman	175,000,000	-	150,000,000	169,000,000	494,000,000	49,400,000	**543,400,000**
Central Java Province	-	-	**150,000,000**	**25,000,000**	**175,000,000**	**17,500,000**	**192,500,000**
Klaten	66,600,000,000	-	**150,000,000**	1,849,000,000	68,599,000,000	6,859,900,000	**75,458,900,000**
Boyolali	318,750,000	-	**150,000,000**	169,000,000	637,750,000	63,775,000	**701,525,000**
Magelang	-	-	**150,000,000**	169,000,000	319,000,000	31,900,000	**350,900,000**
Wonogiri	6,293,750,000	-	**-**	-	6,293,750,000	629,375,000	**6,923,125,000**
Total	108,187,500,000	450,000,000	2,150,000,000	6,244,000,000	117,031,500,000	11,703,150,000	128,734,650,000

Equipment

	Pillar						
	Public administration	Justice	Parliament	Police	Subtotal	Contingency 10%	Total
Yogyakarta Province	-	**-**	**-**	**-**	**-**	-	-
Yogyakarta City	1,400,870,065	21,225,304	7,075,101	48,629,530	1,477,800,000	147,780,000	**1,625,580,000**
Bantul	319,109,747	**-**	39,888,718	334,001,535	693,000,000	69,300,000	**762,300,000**
Kulon Progo	185,397,982	**-**	158,912,556	128,189,462	472,500,000	47,250,000	**519,750,000**
Gunung Kidul	479,839,852	**-**	19,322,410	110,137,738	609,300,000	60,930,000	**670,230,000**
Sleman	256,654,858	**-**	219,989,879	247,855,263	724,500,000	72,450,000	**796,950,000**
Central Java Province	-	**-**	**-**	**-**	**-**	**-**	**-**
Klaten	577,564,396	**-**	1,300,821	16,034,783	594,900,000	59,490,000	**654,390,000**
Boyolali	346,813,995	**-**	163,206,586	183,879,420	693,900,000	69,390,000	**763,290,000**
Magelang	-	**-**	245,877,743	277,022,257	522,900,000	52,290,000	**575,190,000**
Wonogiri	-	**-**	-	-	-	-	**-**

Personnel

	Pillar						
	Public administration	**Justice**	**Parliament**	**Police**	**Subtotal**	Contingency 10%	Total
Yogyakarta Province	-	**-**	**-**	**-**	**-**	-	-
Yogyakarta City	11,375,315	172,353	57,451	394,880	12,000,000	1,200,000	**13,200,000**
Bantul	26,965,742	-	3,370,718	28,224,143	58,560,603	5,856,060	**64,416,663**
Kulon Progo	2,354,260	-	2,017,937	1,627,803	6,000,000	600,000	**6,600,000**
Gunung Kidul	4,725,159	-	190,275	1,084,567	6,000,000	600,000	**6,600,000**
Sleman	8,770,746	**-**	7,517,783	8,470,035	24,758,564	2,475,856	**27,234,421**
Central Java Province	-	**-**	**-**	**-**	**-**	**-**	**-**
Klaten	14,811,182	**-**	33,359	411,199	15,255,740	1,525,574	**16,781,314**
Boyolali	-	**-**	-	-	-	-	**-**
Magelang	-	**-**	-	-	-	-	**-**
Wonogiri	-	**-**	-	-	-	-	**-**

Record

	Pillar						
	Public administration	**Justice**	**Parliament**	**Police**	**Subtotal**	Contingency 10%	Total
Yogyakarta Province	-	**-**	**-**	**-**	**-**	-	-
Yogyakarta City	-	-	-	-	-	-	**-**
Bantul	315,646,969	-	39,455,871	330,377,160	685,480,000	68,548,000	754,028,000
Kulon Progo	-	-	-	-	-	-	**-**
Gunung Kidul	-	-	-	-	-	-	**-**
Sleman	-	**-**	-	-	-	-	**-**
Central Java Province	-	**-**	**-**	**-**	**-**	**-**	**-**
Klaten	862,785,966	**-**	1,943,212	23,953,322	888,682,500	88,868,250	977,550,750
Boyolali	-	**-**	-	-	-	-	**-**
Magelang	-	**-**	-	-	-	-	**-**
Wonogiri	-	**-**	-	-	-	-	**-**

BANKING AND FINANCE

Table A.27: Snapshot of the Yogyakarta Banking Sector, Pre-Disaster, End of March 2006

All values in Rp Billion unless stated otherwise			
Number of Banks have business in Yogyakarta	**Yogyakarta Province**	**Indonesia**	**%**
Commercial Banks:	25	131	19
- State Banks	4	5	100
- Private Banks (including foreign & JV)	20	100	20
- Regional Bank (BPD)	1	26	
Rural Credit Bank (BPR)	65	1,906	3
Number of Banks Offices / Branches	**Yogyakarta Province**	**Indonesia**	
Commercial Banks:	41		
- State Banks (excluding BRI unit)	11	1,755	0.6
- Private Banks (including foreign & JV)	24	3,925	0.6
- Regional Bank (BPD)	6	709	0.8
Rural Credit Bank (BPR)	65	1,906	3.4
Total Banks Asset	13,611	1,465,300	0.9
Total Banks Deposit	12,385	1,146,230	1.1
Total Banks Loans (Commercial and BPR)	6,780	687,528	1.0
1. Commercial Banks Loans	5,951	674,698	0.9
- Working Capital Loans	2,320	340,887	0.7
- Investment Loans	842	129,399	0.7
- Consumption Loans	2,789	204,411	1.4
NPL (%)	4.11%	9.40%	
2. Rural Credit Banks (BPR) Loans	829	12,830	6.5
NPL (%)	8.96		

Source: Bank Indonesia

Table A.28: Commercial Banking Credits by Sector and Districts in Yogyakarta (Rp Billion)

Pre-Disaster End of March 2006

Sectoral Distribution of GRDP and Banking Sector Credits	Yogyakarta Province		Districts of Yogyakarta (commercial banking credits)				
	% in GRDP	% in Bank Credit	Bantul	Gunung Kidul	Kulon Progo	Sleman	Yogyakarta
Agriculture	18.7	3.0	65	10	19	32	68
Mining	0.7	0.4	-	1	-	19	1
Manufacturing (industry)	**14.5**	**9.8**	14	3	2	63	489
Utilities (Electricity, Gas and Water)	0.9	0.0	-	-	-	-	2
Construction	8.3	3.1	1	1	2	117	64
Trading, Restaurant, and Hotel	**20.8**	**23.7**	104	102	56	210	957
Transportation and warehousing	9.9	1.5	1	1	12	1	67
Finance and Services	26.3	10.5	36	10	2	62	507
Others – Including Consumer Loans		**48.0**	190	168	179	380	1,934
Total		**5,952**	**411**	**296**	**272**	**884**	**4,089**
Total (%)	100.0	100.0	6.9	5.0	4.6	14.9	68.7

Source: Bank Indonesia

Table A.29: Banking Credits by Districts in Yogyakarta, Pre-Disaster End of March 2006 (Rp billions)

			Districts of Yogyakarta				
	Yogyakarta Province	Yogyakarta Province	Bantul	Gunung Kidul	Kulon Progo	Sleman	Yogyakarta Citykarta
A. Credits by Type of Bank and Usage		**6,780**	**586**	**325**	**369**	**1,354**	**4,146**
1. Commercial Banks	**100**	**5,951**	**410**	**295**	**273**	**884**	**4,089**
- Working Capital Loans	39	2,320	183	95	83	394	1,563
- Investment Loans	14	842	48	33	29	127	606
- Consumption Loans	**47**	2,789	179	167	161	363	1,920
2. Rural Credit Banks (BPR)		**829**	**176**	**30**	**96**	**470**	**57**
B. Share of Credits provided by BPR							
1. Commercial Banks		88	70	91	74	65	**99**
2. Rural Credit Banks (BPR)		12	**30**	9	26	**35**	1
C. NPL of Credits by Regions							
1. Commercial Banks		4.11	2.26	1.61	2.94	2.47	4.91
2. Rural Credit Banks (BPR)		**8.69**	**17.95**	3.42	**7.25**	**6.60**	**6.48**

Source: Bank Indonesia

Table A.30: Impact of the Earthquake - Potential Loan Losses Estimation (Rp million)

Yogyakarta Province

	# Banks	# affected debtors	Loan Losses
Commercial Banks:	25		1,213,238
- State Banks	4	7,792	310,580
- Private Banks (including foreign & JV)	20	1,365	304,278
- Regional Bank (BPD)	1	28,325	464,675
Rural Credit Bank (BPR)	65	21,008	133,705
Top Losses:		**# affected debtors**	**Loan Losses**
BPD:			
- Bank BPD Yogyakarta	Local	28,325	464,675
STATE OWNED BANKS:			
- Bank BRI	State	4,791	174,818
- Bank BTN	State	1,001	49,271
- Bank Mandiri	State	1,504	48,600
- Bank BNI (including Syariah)	State	496	37,891
Total SOE Banks:		7,792	310,580
PRIVATE OWNED BANKS:			
- Bank Bukopin	Private	78	127,389
- Bank Danamon Indonesia	Private	856	51,277
- Bank Muamalat Indonesia	Private	70	32,699
- Bank BCA	Private	20	23,344
- Bank Permata	Private	137	21,684
- Bank Lippo	Private	47	18,574
- Bank BBI	Private	16	6,242
- Bank Syariah Mandiri	Private	35	5,800
- Bank Ekonomi Raharja	Private	6	5,575
- Bank Bumiputera	Private	10	5,203
- Bank NISP	Private	13	1,750
- Bank ANK	Private	37	1,581
- Bank Century	Private	6	1,045
- Bank Mega	Private	7	1,020
- Bank Haga	Private	2	1,000
- Bank CNB	Private	25	95
- Bank Niaga, BII, BTPN, Panin	Private	Not reported	Not reported
Total Private Owned Banks:		1,365	304,278
TOTAL COMMERCIAL BANKS:		**37,482**	**1,079,533**
TOTAL 65 BPR'S:		**21,008**	**133,705**
TOTAL BAD LOAN OF BANKING:		**58,490**	**1,213,238**

Source: Bank Indonesia, Yogyakarta office

Central Java Province– Klaten District only

Name	# of Debtors	Outstanding Loans	Share (%)	# of potential loan losses
Bank BRI	18,402	291,063	36.1	145,532
Bank BPD CENTRAL JAVA	10,348	194,481	24.1	97,241
Bank DANAMON INDONESIA	1,035	73,986	9.2	14,797
Bank BNI	2,741	72,209	9.0	14,442
Bank NIAGA	313	65,251	8.1	13,050
Bank MANDIRI	492	28,669	3.6	5,734
Bank BTN	697	12,580	1.6	2,516
Bank MEGA	1,232	10,517	1.3	2,103
Bank BII	56	9,854	1.2	1,971
Bank NISP	131	7,375	0.9	1,475
Bank BUANA INDONESIA	56	7,313	0.9	1,463
Bank BUKOPIN	79	6,421	0.8	1,284
Bank BCA	19	5,783	0.7	1,157
LIPPOBANK	43	5,065	0.6	1,013
Bank PANIN	45	4,773	0.6	955
Bank HAGA	17	4,608	0.6	922
PERMATA	10	3,220	0.4	644
Bank BUMI ARTA	17	1,836	0.2	367
Bank WINDU KENTJANA	2	260	0.03	
CENTRATAMA NASIONAL	10	242	0.03	
Bank HARDA INTERNASIONAL	22	136	0.02	
Bank MAYAPADA	4	32	0.004	
TOTAL	**35,771**	**805,674**		**306,664**

Source: Bank Indonesia Solo

ENVIRONMENT

Table A.31: Estimate of Building Debris Based on Number of Damaged Houses, Yogyakarta And Central Java

LOCATION	Infrastructure Damage			Waste Volumes (m3) @ 10m3/house			Totals (m3)	Waste Volumes
Waste Volume (m3)	Houses			Houses (50m2 single storey brick)				Recycling @ 45%
				20	15	5		
	Destroyed	Severe Damage	Slight Damage	Destroyed	Severe Damage	Slight Damage		Totals (m3)
Central Java	**47,519**	**58,185**	**80,887**	**950,382**	**872,775**	**404,433**	**2,227,590**	**1,225,175**
Bantul	26,045	29,582	24,262	520,902	443,732	121,311	1,085,945	597,269
Sleman	4,719	14,403	29,910	94,374	216,041	149,549	459,963	252,980
Yogyakarta	1,948	4,119	2,355	38,952	61,790	11,777	112,518	61,885
Kulon Progo	3,485	4,726	7,999	69,696	70,889	39,996	180,581	99,319
Gunung Kidul	11,323	5,355	16,360	226,458	80,325	81,801	388,584	213,721
Yogyakarta	**27,796**	**58,026**	**86,281**	**555,912**	**870,386**	**431,406**	**1,857,704**	**1,021,737**
Klaten	27,270	55,112	84,283	545,400	826,686	421,416	1,793,502	986,426
Magelang	179	456	592	3,582	6,845	2,961	13,388	7,363
Boyolali	276	626	637	5,526	9,396	3,186	18,108	9,959
Sukoharjo	46	1,627	-	918	24,408	-	25,326	13,929
Wonogiri	15	11	67	306	162	333	801	441
Purworejo	9	193	702	180	2,889	3,510	6,579	3,618
Total	**75,315**	**116,211**	**167,168**	**1,506,294**	**1,743,161**	**835,839**	**4,085,294**	**2,246,911**

Assumptions:
Truck movements @ 4m3/trip: 561,728
@ 50% assumed as fill on site: 280,864
200*6 trucks/day 120 Yogyakarta Province & 80 Central Java: 234.05
@20000000/truck/month & 1/2 63000000/front loader/month = 51500000* Rp 109,579,487,109
@9200: US$ 11,910,814
Labor 5*20000*12 1,200,000
Labor costs for destroyed & severe damage Rp 229,830,480,000

ECONOMIC AND SOCIAL IMPACTS

Table A.32: Distribution of losses across affected districts

										2006			2007		
	Loss Share SME % (1)	Loss value added SME (2)	Loss Share agriculture % (3)	Loss value added Agric. (4)	Aggregated VA Loss (2)+ (4)	Extrapolated Overall VA loss*	VA in 2006	VA in 2007	GRDP 2004	Projection GRDP	Revised Projection GRDP	Expected GRDP Decline %	Projection GRDP	Revised Projection GRDP	Expected GRDP Decline %
Yogyakarta Province		**1,670**		**238**	**1,908**	**2,177**	**1,633**	**544**	**21,848**	**24,363**	**22,730**	**-6.7**	**25,727**	**25,183**	**-2.1**
Bantul	55	1,244	7	18	1,261	1,439	1,079	360	4,171	4,652	3,572	-23.2	4,912	4,552	-7.3
Gunung Kidul	4	85	0	-	85	97	73	24	3,378	3,766	3,693	-1.9	3,977	3,953	-0.6
Kulon Progo	4	88	27	68	157	179	134	45	1,836	2,047	1,913	-6.5	2,162	2,117	-2.1
Sleman	7	147	61	151	298	340	255	85	6,640	7,404	7,149	-3.4	7,819	7,733	-1.1
Yogyakarta	5	106	0	0	106	122	91	30	5,876	6,552	6,461	-1.4	6,919	6,889	-0.4
Central Java Province		**588**		**11**	**599**	**684**	**513**	**385**	**193,438**	**215,710**	**215,197**	**-0.24**	**227,789**	**227,405**	**-0.17**
Klaten	26	588	5	11	599	684	513	171	5,125	5,715	5,202	-9.0	6,035	5,864	-2.8

Methodology: District-specific assessment of losses for the manufacturing and agriculture sector, accounting for 90% of total losses, was available for all affected districts. The remaining 10% of the total loss was distributed across districts based on each district's share of losses in these two sectors. Value added was computed based on sector-specific input-output factor reported in the economic impact section.

Selected Economic Indicators

Table A.33: Economic Structure per District and Province, FY 2004 (in Rp billion)

	Agriculture	Construction	Electricity, Gas, Water Supply	Financial Services	Manufacturing	Mining, Quarrying	Services	Trade, Restaurant, Hotel	Transportation, Communication	Total
Yogyakarta Province	**3,637.00**	**1,744.00**	**268.10**	**2,199.00**	**3,219.00**	**182.50**	**4,290.00**	**4,171.00**	**2,137.00**	**21,847.60**
Bantul	967.38	350.27	49.82	277.58	854.04	46.01	610.76	738.74	276.79	4,171.38
Gunung Kidul	1,212.58	247.58	23.27	156.96	412.80	80.44	549.62	475.99	218.29	3,377.53
Kulon Progo	463.37	88.79	14.98	111.06	285.76	16.44	375.38	297.98	182.08	1,835.82
Sleman	1,029.82	630.36	75.89	730.98	1,075.61	28.11	1,307.56	1,391.73	369.46	6,639.51
Yogyakarta	29.79	376.54	103.67	903.57	678.29	0.49	1,404.94	1,337.47	1,041.13	5,875.89
Central Java Province	**38,490.00**	**10,900.00**	**2,362.00**	**7,141.00**	**63,140.00**	**1,855.00**	**19,650.00**	**38,940.00**	**10,960.00**	**193,438.00**
Klaten	1,161.53	423.88	67.49	241.40	1,012.46	28.32	734.68	1,305.25	149.90	5,124.91
Magelang	1,342.22	209.24	30.64	114.11	769.42	93.05	688.29	676.03	225.26	4,148.25
Boyolali	1,496.60	100.48	39.85	268.07	751.05	31.68	313.62	1,128.22	117.69	4,247.27
Sukoharjo	968.63	203.97	80.18	160.19	1,381.92	43.64	408.32	927.84	245.20	4,419.90
Wonogiri	1,605.51	107.28	29.81	136.81	142.52	21.92	395.74	401.63	324.63	3,165.87
Purworejo	1,342.22	209.24	30.64	114.11	769.42	93.05	688.29	676.03	225.26	4,148.25
Indonesia	**347,600.00**	**116,000.00**	**31,970.00**	**190,500.00**	**578,900.00**	**206,800.00**	**205,200.00**	**390,300.00**	**135,600.00**	**2,202,870.00**

Table A.34: Economic Structure per District and Province, FY 2004 (%)

	Agriculture Total		Construction Total		Electricity, Gas & Water Supply Total		Financial Services Total		Manufacturing Total		Mining and Quarrying Total		Services		Trade, Restaurant & Hotel Total		Transportation and Communication Total		Total	
	% row	% column	% row	% column	% row	% column	% row	% column	% row	% column	% row	% column	% row	% column	% row	% column	% row	% column	% row	% column
Yogyakarta Province	16.6	100	8.0	100	1.2	100	10.1	100	14.7	100.0	0.8	100	19.6	100	19.1	100	9.8	100	**100**	100
Bantul	23.2	26.6	8.4	20.1	1.2	18.6	6.7	12.6	20.5	26.5	1.1	25.2	14.6	14.2	17.7	17.7	6.6	13.0	**100**	19.1
Gunung Kidul	35.9	33.3	7.3	14.2	0.7	8.7	4.6	7.1	12.2	12.8	2.4	44.1	16.3	12.8	14.1	11.4	6.5	10.2	**100**	15.5
Kulon Progo	25.2	12.7	4.8	5.1	0.8	5.6	6.0	5.1	15.6	8.9	0.9	9.0	20.4	8.8	16.2	7.1	9.9	8.5	**100**	8.4
Sleman	15.5	28.3	9.5	36.1	1.1	28.3	11.0	33.2	16.2	33.4	0.4	15.4	19.7	30.5	21.0	33.4	5.6	17.3	**100**	30.4
Yogyakarta	0.5	0.8	6.4	21.6	1.8	38.7	15.4	41.1	11.5	21.1	0.0	0.3	23.9	32.7	22.8	32.1	17.7	48.7	**100**	26.9
Central Java Province	19.9	100	5.6	100	1.2	100	3.7	100	32.6	100	1.0	100	10.2	100	20.1	100	5.7	100	**100**	100
Klaten	22.7	3.0	8.3	3.9	1.3	2.9	4.7	3.4	19.8	1.6	0.6	1.5	14.3	3.7	25.5	3.4	2.9	1.4	**100**	2.6
Magelang	32.4	3.5	5.0	1.9	0.7	1.3	2.8	1.6	18.5	1.2	2.2	5.0	16.6	3.5	16.3	1.7	5.4	2.1	**100**	2.1
Boyolali	35.2	3.9	2.4	0.9	0.9	1.7	6.3	3.8	17.7	1.2	0.7	1.7	7.4	1.6	26.6	2.9	2.8	1.1	**100**	2.2
Sukoharjo	21.9	2.5	4.6	1.9	1.8	3.4	3.6	2.2	31.3	2.2	1.0	2.4	9.2	2.1	21.0	2.4	5.5	2.2	**100**	2.3
Wonogiri	50.7	4.2	3.4	1.0	0.9	1.3	4.3	1.9	4.5	0.2	0.7	1.2	12.5	2.0	12.7	1.0	10.3	3.0	**100**	1.6
Purworejo	33.6	2.6	5.8	1.6	1.0	1.3	5.5	2.3	9.6	0.4	2.4	3.8	19.3	2.9	16.0	1.2	6.7	1.8	**100**	1.5
Indonesia	15.8	26.6	5.3	20.1	1.5	18.6	8.6	12.6	26.3	26.5	9.4	25.2	9.3	14.2	17.7	17.7	6.2			

Figure A.1 Distribution of Economic Sectors per District and Province, FY 2004

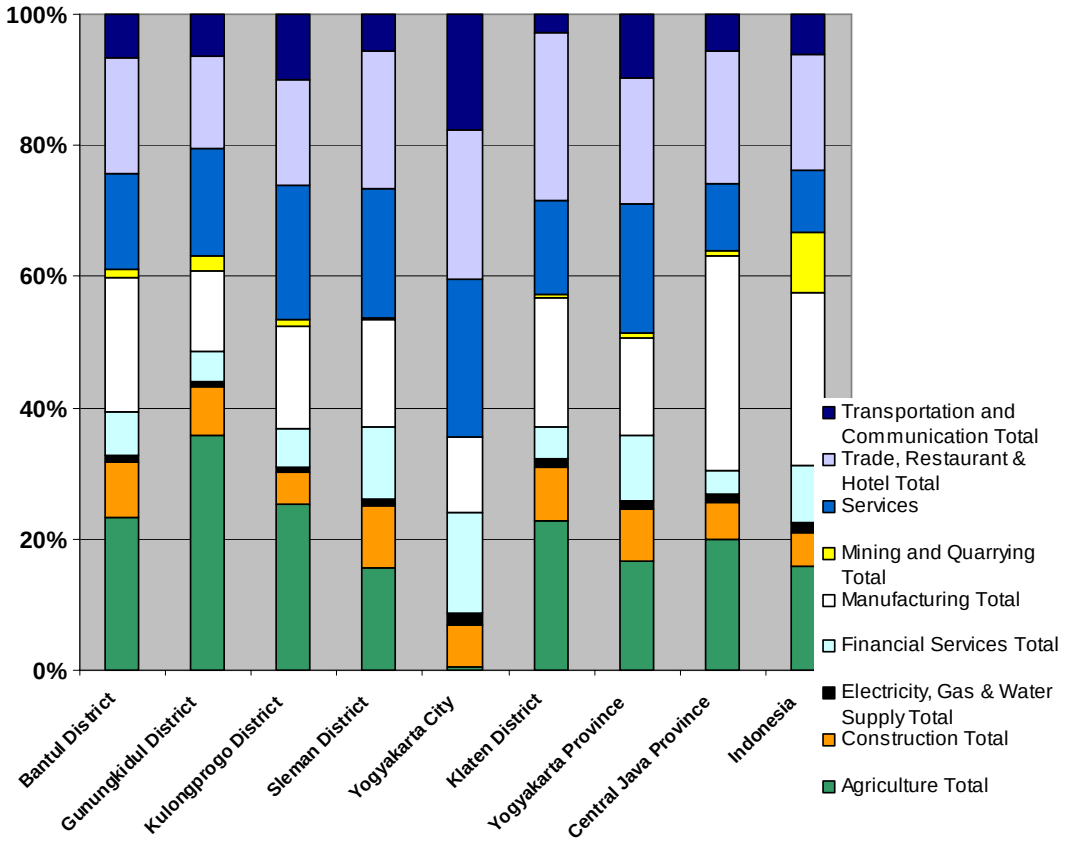

Table A.35: Real GDP and GDP growth (in trillion Rp at constant 2000 prices and percentages)

	GRDP					Annual Real Growth Rate			
	2000	**2001**	**2002**	**2003**	**2004**	**00/01**	**01/02**	**02/03**	**03/04**
Yogyakarta Province	117.4	127.8	140.5	152.4	165.4	4.3	4.5	4.6	5.1
Bantul	2.58	2.68	2.80	2.93	3.08	3.74	4.46	4.69	5.04
Gunung Kidul	2.29	2.37	2.44	2.53	2.61	3.38	3.26	3.36	3.43
Kulon Progo	1.19	1.23	1.28	1.34	1.40	3.66	4.12	4.19	4.52
Sleman	3.99	4.17	4.37	4.60	4.84	4.67	4.86	5.08	5.25
Yogyakarta	3.51	3.65	3.81	3.99	4.20	3.95	4.49	4.76	5.05
Central Java Province	114.7	118.8	123.0	129.2	135.8	3.6	3.5	5.0	5.1
Klaten	3.14	3.27	3.39	3.56	3.74	4.14	3.91	4.91	4.95
Indonesia	1,359	1,407	1,470	1,536	1,607	3.5	4.5	4.5	4.6