THE PADANG PANJANG LANDSLIDE DISASTER A CASE STUDY

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I. INTRODUCTION

Padang Panjang is a small town in West Sumatra, with its area being 23 km2 and it has 34,870 inhabitants, with its population density being 1,516 people per km2. The most terrifying earthquake disaster leveling all the stone houses of the inhabitants took place in this town in 1926. The number of casualties at that time is not known precisely, for the official figures of those casualties have not yet been disclosed up to now. Since then there had been no more big disasters so that its inhabitants were inattentive and never imagined that there would be a very fatal landslide disaster. Realizing that Padang Panjang is, when viewed from the geological aspect, surrounded by three mountains to the north, namely Mount Tandikat, Mount Singgalang and Mount Merapi (which is still active) and is railed off from its south part by Tui Hill as the sequence of the Bukit Barisan Mountains, the inhabitants and the Administration of Padang Panjang Municipality should have had an understanding of Disaster preparedness. Moreover, this town is known as a rainy town in which daily rain has been a matter of routine.

The matter of routine taking palce for tens of years caused the hydrological aspect to have been entirely forgotten as one of the causes of landslide disaster. The repeated occurences of landslide disaster (Galodo) in West Sumatra in previous years did not likewise arise the vigilance of the Padang Panjang inhabitants about the coming of the landslide disaster causing the fall of 131 casualties on May 4, 1987. I do not intend to present a scientific analysis on the reasons causing the landslide in Padang Panjang, for I am indeed not

an expert in it. This working paper will only elucidate the aspect of life environment and the aspect of preparedness in facing a disaster experienced by a town in Indonesia.

II. The Situation Prior To The Landslide Disaster.

1. Environment.

a. In the middle side of the Tui Hill leg there were activities of small-scale industries in the field of lime processing and milling-lime traditionally carried on by the people since tens of years ago. The basic materials of lime-rock for those small-scale industries were dug out of the Tui Hill leg. The number of small scale industries carrying on the lime processing was 19 and the number of those carrying on the milling-lime/corallex was 10. The number of daily workers at the two types of these industries was 221 people. Around this location there were houses of the inhabitants both the houses of the workers working at those industries and those of the ordinary inhabitants. The excavation of lime-rock on the hill leg could make the mass of rock above it labile. The danger resulting from this was not thought about. In 1986 the Municipality Administration already thought about moving this industry location to anohter location, but the idea was not based on the possibility of the coming of natural disaster, it was merely based on the purpose of reducing pollution inside the town. The difficulty to find a more adequate place in terms of socio-economic aspect caused that idea to have never been implemented till the coming of the disaster.

b. In the other side of the sloping leg of Tui Hill there was a housing complex comprising 63 units intended for the teachers of elementary school. This housing complex had just been finished and when the disaster took place this complex was dwelt in by ± 40 families. Although there was an urgent need for houses, yet this complex was due to various reasons not immediately occupied by the owners One of the reasons expressed was that the location was not a sufficiently good location for housing, because it was situated far enogh from the town centre and its land did not have a level surface, and it was very near to the hill. Then again, in this condition there was no prediction at all from the Municipality Administration toward the possibility of the coming

of disaster both from the aspects of : pre-disaster physical planning of human settlement; building measures for minimizing the impact of disasters and in the framework of the management of settlement. When the Municipality Administration itself did not think of such a matter yet, it was very irrational to expect that such thought would emerge fron the laymen.

c. A prominent Indonesian geologist Prof. Dr. J.A. Katili (Director General of Geology and Mineral Resources) expressed that the possibility of the coming of landslide disaster in Tui Hill had actually been known since 1983. Because the estimated situation was sufficiently dangerous, it was at that time suggested that the inhabitants living around the dangerous location should be moved to another safer area.
The activities of lime processing industries might be continued, provided that the inhabitants did not live in that location.
Prof. Katili stated that the hill structure at that location of disaster really enabled the coming of landslide disaster, especially when there was sufficiently heaty rain.
With the presentation of that statement the prediction toward the danger of natural disaster at the location was actually made and should have been considered in the framework of developing City–planning.

2. **The Organization To Overcome Disaster prior to the coming of disaster.**

Every Municipality (Second Level Region) certainly has a SATKORLAK (COORDINATING TASK FORCE OF IMPLEMENTATION) of the Natural Disaster Overcoming formed by virtue of a Mayoral Decision.
In Padang Panjang such a SATKORLAK has also existed, and the latest one was formed by virtue of the Decision Letter of the Mayor/Head of Second Level Region of Padang Panjang No. 133/Wako/PP/1982 dated December 3, 1982. When the personnel composition of the SATKORLAK is analysed, it looks more similar to the list of government agencies and organizations available in Padang Panjang than an organization prepared to overcome Natural Disaster. That order of personnel composition has not yet described the function of each government agency/organization in overcoming natural disaster, in implementing the tasks of :

Communication (warning); rescue team; Medical Service; relief administrator, rehabilitative measures, etc. Some peculiarities found in the personnel composition order are inter alia :
Information Office (No. 8); Office of Social and Political Affairs (No. 10); Regional Development Bank (No. 14); State-Owned Electricity Enterprise (No. 15); Agricultural Service (No. 17); Financial Department of the Municipality (No. 20). In the next order the Civil Defense organization and the Indonesian Red Cross emerge (No. 21 and No. 22), whereas these two organizations have been well known as members of the Rescue Team.
This composition of SATKORLAK Organization is also provided with 3 women's organizations, namely : BKOW; Dharma Wanita; and Dharma Pertiwi (respectively under serial numbers of 28, 29 and 30).
Based on the above description, it can be seen that the Disaster Preparedness aspect has not yet been understood deeply when considering that the functions of the available government agencies/organizations have not yet been given priority in accordance with their respective functions.

3. Monitoring Toward Disaster Possibility.

Since disaster seldom takes place in Padang Panjang and the old inhabitants experiencing the 1926 devastating disaster have been very few, the degree of indifference among them toward disaster is sufficiently high. The only possibility of the coming of disaster always monitored is the behaviour of Mount Merapi which is still active and often throws volcanic ashes into the air. This monitoring is carried out by the Padang Panjang Office of Meteorology and Geophysics. It is this Office which records the earthquake vibrations in its nearby area and constantly observes the behaviour of Mount Merapi.
The observation toward the possibility of the coming of other disaster(s) in Padang Panjang may be said to be of no existence, so that the acts for prevention as well as preparedness automatically do not exist either.
This kind of condition will lead to the situation of being unable to avoid the fall of maximum victims if a disaster comes.

III. The coming of disaster and the effort to overcome it.

1. One week prior to the coming of that disaster, it rained everyday

in Padang Panjang. This was considered normal by its inhabitants, for their town is indeed a rainy town. On May 4, 1987 at approximately 15:00 (fifteen hours) it rained cats and dogs, whose raindrop was later known to have reached 170 mm (the average of 20–30 mm a day). At 16:25 the Mayor got a telephone call from the on-duty guard at the Municipality Office that there was a big flood near the Town Hall.

At 16:30 the Mayor received the radio news from the on-duty guard that landslides had taken place in Andok River (the housing complex of the elementary school teachers) and in Tanah Hitam. This information was received from a daughter of an ORARI (Organization of Indonesian Amateur Radio) member. At 17:15 the biggest landslide took place in Bancah Laweh, leveling the houses of the inhabitants and 7 units of lime industry situated at the leg of Tui Hill.

It appeared that at the same time the landslide disasters already took place at three locations at the slope of Tui Hill, at five locations in the area of Andok River et cetera, and at thirteen locations on the road between Padang and Padang Panjang shutting about 700 vehicles in.

2. Using a Handy Talky, the Mayor in his capacity as Chairman of SATKORLAK tried to get in touch with the on-duty guard at the Municipality Office and ORARI members in order to spread the news on that disaster to the (Municipality) officials, SATKORLAK members and the public to go immediately to the disaster locations to give help. On this night the rescue efforts were carried out by the public from all walks of life in the pitch-dark and the continually heavy rain. This first phase search was carried out with the high spirit of mutual help and was not yet coordinated in well organized units of community. It is necessary to know that mutual help is the personality of Indonesian people in carrying out heavy tasks though that characteristic of mutual help is getting decreased. Yet especially in facing a disaster the characteristic of mutual help remains high as pointed out by Prof. Dr. Koentjoroningrat: "Only in the time of accident and death, the mutual help done with spontaneity and without ulterior motives to help the family getting into calamity does not get decreased. It is in this field the mutual help remains unchanged up to now".

3. The rescue and search with the mutual-help spirit in that first night successfully found 7 corpses, took 80 wounded people to the Padang Panjang Hospital and 7 seriously wounded people to the Ahmad Mukhtar Hospital in Bukit Tinggi (19 km from Padang Panjang).
   With the finding of many victims the Padang Panjang Hospital, ambulances, doctors and nurses were directly involved at the outset in providing the victims with help. Since the hospital in Padang Panjang had limited facilities, some assistance had to be required from Bukit Tinggi, Batu Sangkar and Solok.

4. At the first night a Command Post situated at Panti Budaya and an Auxiliary Command Post situated at Gedung Olah Raga were directly established. These posts were at the same time were used to accomodate approximately one thousand people who had to be evacuated.
   On the next day, May 5, 1987, it was realized that there was an urgent need of forming a special team to overcome the Victims of the Landslide Disaster taking place on May 4, 1987 in the Padang Panjang Municipality.
   The special team formed and headed by the Mayor might already be considered as a well planned Team-Work in order to overcome natural disaster, with the following composition of main components :

   a. The search for victims and the security—headed by the Commandant of the Military District of 0307 Tanah Datar with the members. the Battalion 133 Police/Yudha Sakti, Mobile Brigade Company (Kie Brimob), Civil Defense (Hansip) and others.

   b. Provisional accomodation: led by the Head of Subdistrict Administration (Camat) and assisted by the Head of Village Administration (Lurah).

   c. Health—led by the Health Service with the members : Padang Panjang Hospital, Community Health Centre (Puskesmas), Health Platoon (Ton Kes), and Yarsi Hospital.

   d. Fund-Raising and Building—led by the Head of the Office of the Public Prosecutor, Bank Executive Board and others.

   e. The search for new land/location—led by the Head of the

Regional Development Planning Body (Bappeda), with the members: The Office of Agrarian Affairs, IKAAH, Department of Governmental Affairs, Office of Agricultural Affairs.

f. Services/Assistance Mobilization—led by the Office of Social Department, with the members: department of Public Welfare and others.

g. Reconstruction and employment—led by the Head of the Padang Panjang Public Works, with the members: the Office of Social Department, Construction Department of the Batu Sangkar Public Works section, City-Planning Service.

h. Public Kitchen (Consumption)—composed of the Head of Dharma Wanita; Logistics of Battalion 133 and others.

5. The victims of the disaster were all buried under landslide. The search efforts were supported by the mobilization of some pieces of heavy equipment such as excavator, scope loader from Ziepur, the Public Works Service of Solok Regency and P.T. Subur Bros.

The efforts to search for the corpses took 8 days, from May 4 through May 11, 1987. These corpses were buried under landslide whose estimated volume was 750,000 m3.

The description of daily found corpses :

May 4, 1987	—	7 corpses
May 5, 1987	—	39 corpses
May 6, 1987	—	22 corpses
May 7, 1987	—	15 corpses
May 8, 1987	—	18 corpses
May 9, 1987	—	11 corpses
May 10, 1987	—	17 corpses
May 11, 1987	—	1 corpses
Total		130 corpses

Two months later, on July 11, 1987, one more buried corpse was found at the Housing Complex of elementary school teachers so that the total corpses found became 131.

6. Among the 131 casualties, 53 were under 10 years of age, 16 were between 11 up to 20 years of age.
The fall of so many casualties was inter alia due to heavy rain that the people were staying at home and the event took place

in the afternoon at which time the people were staying indoors waiting for the time to break the fast.

7. The description of total casualties/losses is as follows :
   a. Passing away – 131 people. Estimated missing people–9.
   b. 71 houses being destroyed.
   c. 54 houses suffering minor damages.
   d. 9 houses belonging to the elementary school teachers being seriously damaged, 5 houses being slightly damaged.
   e. 2 Buildings of Elementary School.
   f. 7 units of lime industry.
   g. Road – 1,900 m.
   h. Drinking water pipe – 1,500 m.
   i. Irrigation – 2.
   j. Rice–field covered with mud – 6 ha.
   k. Electricity network and transformer.
   l. Railway track and others.
   m. The area impossibly occupied being 15 ha.

   The estimated total loss being Rp 1.500.000.000,–
8. The number of Family Heads to be transmigrated being 1929.
9. The task forces taking part in overcoming the disaster: Land Force, Police, Civil Defense, Indonesian Red Cross Search And Rescue (SAR), University's Student Regiment (Menwa), AMPI, Korpri, Pramuka, Dharma Wanita, IKIP and other.
10. The amount of assistance in the form of money received on August 6, 1987 was Rp 969,575,772.00

IV. CONCLUSION.

Based on the foregoing the following conclusion may be adopted :

1. The coming of the landslide disaster in Padang Panjang was not something without prediction. That disaster had been previously predicted, but that prediction was not disseminated so that it was not known by the general public.

   The coming of the disaster was impossibly avoided, but the fall of so many casualties might actually be avoided by providing prevention/evacuating the inhabitants living at the leg of Tui Hill.
2. The factors of life environment and prevention has not yet been

given priority in the planning of town expansion and inhabitant settlement.

3. The preparedness factor in facing disaster has not yet been adequate whose proof could be seen from the establishing of the effective Special Team To Overcome Disaster just after the coming of the disaster.
4. The Rescue Team professionally engaged for the first time in overcoming the disaster was ORARI (though it was not registered as a member of SATKORLAK PBA) and the Hospitals accompanied by doctors and nurses. The other members of the Rescue Team engaged themselves in an organized manner on the next day.
5. The appearance of the Indonesian Forces (ABRI) taking the leading part indicated that civilian task forces attempting to overcome disaster was still very weak and are in need of being promoted.

This working paper of mine is thus ended and in order to complete this presentation, please see the exhibited photographs.

Thank you

PADANG PANJANG LANDSLIDE

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1. Landslides frequently occur in Bukit Barisan Mountain range, because of the rugged terrain and high rainfall. In addition the active transcurrent fault that runs along the Sumatra island's axis line may also trigger the landslide because of the seismicity it produces. The fault plane of the Great Sumatra Fault is expressed in fault scarps, which usually form steep slopes bounded the elongated valleys along the fault. These steep slopes are usually very prone to the landsliding;

2. Padang Panjang area is an elongated NW–SE valley located in the crest of the Bukit Barisan Mountain range and is part of the Great Sumatra Fault Zone. In the northeast, the fault scarp is inffered by the Quaternary volcanic products of Merapi volcano. This active volcano, supposed to be the most impending natural hazard to the people in this area, is monitored by the Volcanological Survey of Indonesia, Department of Mines and Energy, from permanent observatories located in Batu Palano, and in Bukittinggi.

   In the south, the Padang Panjang valley is bounded by a mountain called Bukit Tui. The mountain is formed by Triassic sedimentary rock consisting of metasediments and limestone which is also slightly metamorphosed. The sediment is dipping northeast forming a dipslope of the steep slope of the Great Sumatra Fault scarp;

3. Since the dipslope here is very steep, as normaly found in this area, the stability is very low. The Triassic rocks which is more than 80 million years old, produce thick overburden which is

loose and easily eroded. It was reported also that the rainfall has been very high several days and several hours before the landslide took place. The slope stability is getting worst because of the intensive open pit limestone mining, carried out by the inhabitants without sufficient knowledge of the mining technique. The quarry is dug downslope, leaving the upper slope hanging. This very labil block consists of thick soil and fresh rock;

4. The Provincial Office of the Department of Mines and Energy in West Sumatra, already warned the miners and local government about this wrong mining technique. The quarries must be moved to the other side of the mountain in the upperslope, which was agreed by local government and a plan was drafted.
   However before it is realized the landslide already took place;

5. The miners and labour usually came from the urban area in the vicinity of Padang Panjang. They settled in the temporary houses around the mining sites to keep close to the working site. Apparently the temporary houses were built on the down slope area of the Tui Mountain. Moreover the labours used to stay temporarily with their fellow labours flocking the house;

6. The landslide itself is categorized small in size, 500 meters long and about 150 meters wide. The landslide moeved about 750. 000 cubic meters of mass. The unvafourable conditions as mentioned above have caused the victims to reach 131 persons;

7. There was a speculation on the origin of the landslide which associates the landslide with seismic wave of the Tarutung earthquake that occurred on April 27, 1987 or several days earlier. The landslide might have been triggered by the Tarutung earthquake.
   We have checked the seismographs in our observatories in Batu Palano, Merapi and in Bukittinggi.
   The seismometers which are capable to detect the seismicity of less than 2 on Richter scale, do not show any seismic sign before the landslide and after the Tarutung earthquake occurrences. Similarly with the instrument of the Meteorologic & Geophysical Agency station located in Padang Panjang. It is obvious that the landslide has no relationship with the Tarutung earthquake;

8. It may be concluded that the Padang Panjang landslide was partly caused by manmade activity, although high rainfall is the main reason. The unfavourable condition of the quarries and the labour settlements cost a high number of victims as viewed from the size of the landslide which is relatively small.

THE MOUNT GALUNGGUNG CASE THE PROBLEM OF ENVIRONMENT CONTROL AND REHABILITATION

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INTRODUCTION

This paper is intended to provide an insight into the Indonesian experience in disaster prevention, mitigation, preparedness, response (crisis operation) and recovery. More specifically, it is focussed on the activities and experiences resulting from the Mount Galunggung eruption with particular reference in the Disaster Preparedness and Health Management aspect in the affected areas.

OUTLINE

1. Scenario of the occurance.
2. The impact of the disaster.
3. Existing program :
   - 3.1. Objectives.
   - 3.2. Strategies.
   - 3.3. The plan :
     - o Recovery/rehabilitation program.
     - o Prevention and Mitigation.
     - o Preparedness.
4. Conclusions.

DISCUSSIONS

1. SCENARIO OF THE OCCURANCE.

Geologically Indonesia is devided into two major island groups Java, Bali, Nusa Tenggara Barat, Nusa Tenggara Timur, Timor Timur, Maluku and Sulawesi are primarily volcanic islands, while Sumatera,

Kalimantan and Irian Jaya are remnants of the Sunda land.
From the volcanic zone point of view, Indonesia has approximately 128 active volcanoes in the whole countries (in the world about 750 active volcanoes), of which 21 volcanoues are concentrated in Java island. Mount Galunggung (2168 m), one of the 21 volcanoes, lies in West Java province very close to Tasikmalaya and Garut City (See Fig. 1).
Activities of Mount Galunggung consist of :

1822	:	— erupted on the 8th of October 1822 — victims : 4011 people died and injured. (first record in 1822 prepared by Reindwardt)
1884	:	— 50 villages were destroyed by debris flow.
1918	:	— small activity
1982/1983	:	— eruptions occured from 5 th of April 1982 during 11 month with frequencies consist of 35 times strong eruptions and more than 300 times small scale eruptions.

At the surroundings of the Mount Galunggung after the eruption in 1918 there are many people living in somé cities and villages such as Tasikmalaya in the east and Garut in the south. Beside these, there are some agriculture lands and physical infrastructures which gave rise to the other forms of highly productive land cultivation such as rice, maize, vegetables, fruits, and also gave the great importance of intensive livestock production on improved pastures. The tragedy began when the volcanic activity increased and eruption occured at a new location, lower than the previous one.
The new location is Anak Galunggung which lies in the watershed of some rivers, i.e. Cibanjaran, Cikunir and Ciloseh. Ciloseh river flows to the downstream areas through Tasikmalaya City. Mount Galunggung erupted and threw away some bombs, stones, ashes, sands, and felt down to it's sorrounding areas.

During the heavy rain, the materials which are flowing down to the rivers become debris flow (mud flow), which has very strong energy to destory everithing in the down stream areas. There were many people injured and died, physical infrastructures destroyed etc.

2. THE IMPACT OF THE DISASTER.

During the tragedy, some of the villages around the Mount Galunggung are destroyed by erupted materials such as bombs, stones, sands, ashes etc.
Some of buildings, roads, agricultural lands, etc, are destroyed too (See Table 1).
Its impacts consist of :
- negative impact
- positive impact

2.1. NEGATIVE IMPACT.

2.1.1. During the volcanic eruption many people who lived in the surroundings of the volcano moved out to the other places. Some of them were transmigrated by the Government to the other provinces, and others were evacuated to their relatives in safe places or to the evacuation centres which was prepared by the Government. There were many people losing their job opportunities; loss of buildings; loss of land productivities; injured and dead.

2.1.2. The second disaster occured by the lahar flow when heavy rainfall happened in the upper catchment surroundings the volcano.
More than 84.000.000 m3 of material was erupted and nowadays there is about 10.500.000 m3 in the upstream part of Ciloseh, Cibanjaran and Cikunir rivers. About 5.000.000 – 6.000.000 m3 is potentially becoming cold lahar or debris flow in the downstream areas during heavy rainy season.

2.1.3. Although Mount Galunggung is quite calm know, but new problem occures due to the rise of water in the caldera. The caldera is shaped by the eruption and day to day water flows to the caldera by run off and by the rivers which flow around the caldera. The bank or the wall of the caldera is almost not strong enough if water is rising up to the top.
The bank could be destroyed by the water pressure and the water will flow to the lower places, which has very strong energy (10.000.000 cum) to destroy everything in

the downstream reaches of Cibanjaran and Cikunir rivers. In the downstream areas there are 6.000 people living in some villages which are developed in the sand pockets of Ciponyo I, Ciponyo II, Negla, etc. (See Fig 2).
Nowadays there is 7.500.000 cum volume of water in the caldera. The maximum volume of caldera is 40.000.000 cum, and by increase of volume of 2.000.000 cum/year the maximum volume could be achieved within 17 years in the future. During this period if there is no efforts to respond to this problem, it is possible that damage will happen by the geological action such as earthquake, unconsolidated soil or infiltration (permeability) of water in the caldera through ground water process.

2.1.4. Government has decided that the whole sand pocket areas such as Ciponyo I and Ciponyo II, are probibited areas. In the past there were many people lived in these areas but during the volcanic eruption they were evacuated to the other places such as to the transmigration schemes or stayed with their relatives in safer places. Today, they come back to this area again although they know that this area is very dangerous when the debris flow occurs.
In the new place such as at the transmigration location they cannot change their mind and their image that the new transmigration land could be improved to fulfill their life expectations.
Due to the different situation between Mount Galunggung and the transmigration location, it is difficult for them to adapt themselves to the new system of land cultivation etc.
Everyday the number of people who is coming back to this area is increasing and certainly this situation gives some problems related in the environment, job opportunities, land ownership, education, health, security, housing, settlement etc.

2.2. POSITIVE IMPACT.

Due to the type of materials which are erupted to the areas surrounding the Mount Galunggung, several years later these

areas are becoming grown up.
Mount Galunggung is quite calm now, and some fo these materials which are erupted in 1982 are very useful for agricultural cultivation and also for building materials. The positive impact, for instance, is that job opportunities or earnings could be created by these activities for the people who live in some places sorrounding the Mount Galunggung. Beside these, the local Government and the other places such as DKI Jaya also receive benefit from the mining of building materials in the sand pockets as a large quarry pit. DKI Jaya is one of those places which is becoming a good market for sand mining from Mount Galunggung.

During the latter 3 months in July, August and September 1987 as shown in Table 2 and Table 3 we can see the amount of sand mining which is transported to Jakarta by PT. Sarana Karya. The said PT. Sarana Karya is one of the contractors who has the authority to exploit the quarry pit in the sand pockets.
There are 4 contractors who have such undertakings i.e :

a. PT. Sarana Karya Unit I
b. PT. Sarana Karya Unit II
c. PT. Bumindo Prama Jaya
d. PT. Pasir Graha Mas

Table 2. Total production and sending of Mount Galunggung sand to DKI Jaya

No.	Mount (1987)	Production (M3)	Sending (M3)
1	July	11,138	10,548
2	August	9,204	6,282
3	September	7,903	6,876
	T o t a l	28,245	23,706

Table 3. Marketing of Mount Galunggung sand in DKI Jaya

Item Month (1987)	July	August	September
1 Receiving (m2)	10,170	6,210	6,853
2 Sale (m2)	10,170	6,210	6,853
3 Average per day (m3)	338	200,3	229,5

According to the Third Report of 2nd October 1987 prepared by PT. Sarana Karya, during the latest period, PT. Sarana Karya has more than 60 employees and workers who are working in the sand mining consist of :

Government official	:	1 person
Staff of the Company in Jakarta	:	5 person
Staff of the Company at the site	:	6 person
Workers	:	54 person
Total	:	66 person

Beside this, there are many people who are working for the other contractors, and there are also employees working for the other agencies such as PJKA, Public Works etc.
The other benefits are created by the multyplying effect of the marketing and the utilization of Mount Galunggung's materials.

3. THE EXISTING PROGRAM.

3.1. OBJECTIVES.

Government has decided to establish some programs in order to handle some problems which are created by the eruption of the volcano, namely :

a. Emergency reponse, consist of :
   - The establishment of Mount Galunggung Project, belongs to the Ministry of Public Works (MPW) with aim to handle the physical infrastructures which are destroyed by mudflow (debris flow) and to develop

some efforts for mitigation, rehabilitation, recovery, and preparedness.
Beside these, the project also has responsibility on warning system by using the Radar and Telemetering system and traditional warning system such as Kentongan etc.

- Relief, it is more emphasizing in helping the victims who were living in the dangerous areas. Some efforts are : relief on food, health, evacuation, resettlement or transmigration program. These efforts are prepared by inter departemental institutions and communities which are coordinated by Satkorlak Daerah Tingkat I (Provinces), Satkorlak Daerah Tingkat II (Districts), Posko and Sub Posko.

b. The reconstruction plan applied to Mount Galunggung areas has the following objectives:
   - The physical and psychological rehabilitation of the victims and the reintegration of the families and communities.
   - The organization, recuperation and development of economic activities in order to recover all kind of environment, communities and activities of the people.
   - The reconstruction of all destroyed villages and infrastructures.
   - The prevention and mitigation of all negative impact which are created by debris flow, especially during the heavy rain.

3.2. STRATEGIES.

In order to achieve these objectives, Government had determind the following strategies :

a. Coordinate the victims to participate in the rehabilitation/reconstruction and recovery processes where they become active participants.
b. Involve and coordinate the official and private institutions that should or can participate in disaster management, consist of prevention, mitlgation, rehabilitation/ reconstruction and recovery.

c. Protecting the people who live outside of the sand pockets, through debris flow control project.
d. Resettle and transmigrate people who are living in the dangerous areas.
e. Prepare the people and the communities to live with the volcanic phenomenon of Mount Galunggung. The efforts consist of : training for the people and Government officials involved, early warning system (Radar, Telemetering, Traditional system, Communication system, etc.).
f. Rehabilitation of agricultural land which are destroyed by eruption, and create opportunities to get the job for the victims.

3.3. THE PLAN.

In accordance to the objectives and the strategies as mentioned above, the task undertaken by the Government is oriented toward the rehabilitation, mitigation and recovery to the victims.

There are some institutions ivolved and participated in integrated programs through some sectoral development projects. Ministry of Public Works has planned for disaster preparedness activities through some projects, consist of :

a. Mount Galunggung Project.
   This project covered the debris flow control in order to protect the potential areas and many people who live beside the rivers and sand pockets. The project has the task to build dikes, check dams, sand pockets, consolidation dams and other physical infrastructures along the rivers. Mount Galunggung Project also responsible for early warning system in order to minimixe the risk. Due to the new problem created by the caldera of Mount Galunggung, the project also focus on controling of water surface of the caldera. Some alternatives to solve the problem as proposed by the project consist of construction of tunnel, drainage or pumping out of water from the caldera. From fiscal year 1982/1983 to 1986/1987, the amount of budget for this project through Annual Budget (DIP) and Additional Budget (ABP) is Rp. 9.929.211.658,–

In the present fiscal year 1987/1988 the project funds available is only Rp. 151.800.000,– and this budget is sufficient for maintenance only.

b. Quarry pit in sand pockets.
In order to develop the area surrounding of Mount Galunggung, one of the important things is to control the mud flow in some rivers. As mentioned previously, beside Mount Galunggung project, another effort is to keep the capacity of the sand pockets.
During the rainy season, the sand pocket is in function to collect the materials flowing from upper reaches to the downstream areas. From the technical point of view due to the limited capacity of the sand pockets, Government has decided to dig and to move out the materials from the sand pockets. As it is mentioned already, there are some contractors which have the authority to exploit the sand pockets and to supply sands to the consumers. This project can create job opportunities in order to reach established situation especially for the victims.
In order to fulfill the marketing needs, Government has constructed the railway for the transport of materials to
In order to fulfill the marketing needs, Government has constructed the railway for the transport of materials to Jakarta, but no plan yet for the rural roads. The problem now is that the local private companies use the rural roads for their operation. The impact should occur to the environment, such as disturbing human life due to the increase of the traffic, air polution and accidents.

4. CONCLUSIONS.

Related to some problems which is caused eruption of Mount Galunggung, we would have some conclusions as follows :

4.1. Mud flow control project has to be continued to follows the Overall Plan on Integrated Disaster Management of Mount Galunggung.

4.2. In order to get succesful implementation of the plan, it is expected that private companies, communities, public sectors and other entities involved should participate in the im-

plemention of integrated program for disaster preparedness.

4.3. Living in the sand pocket areas is very dangerous at this moment. Local Government has to be able to control these areas as prohibited areas, but on the other hand Government has to prepare other locations and job opportunities for the victims.

4.4. The people cannot do much more to improve themself. As a result of the disaster, they lose their land, lose their cultivation, lose their housing and properties etc.
It is necessary to support them through rural development or rural improvement projects.

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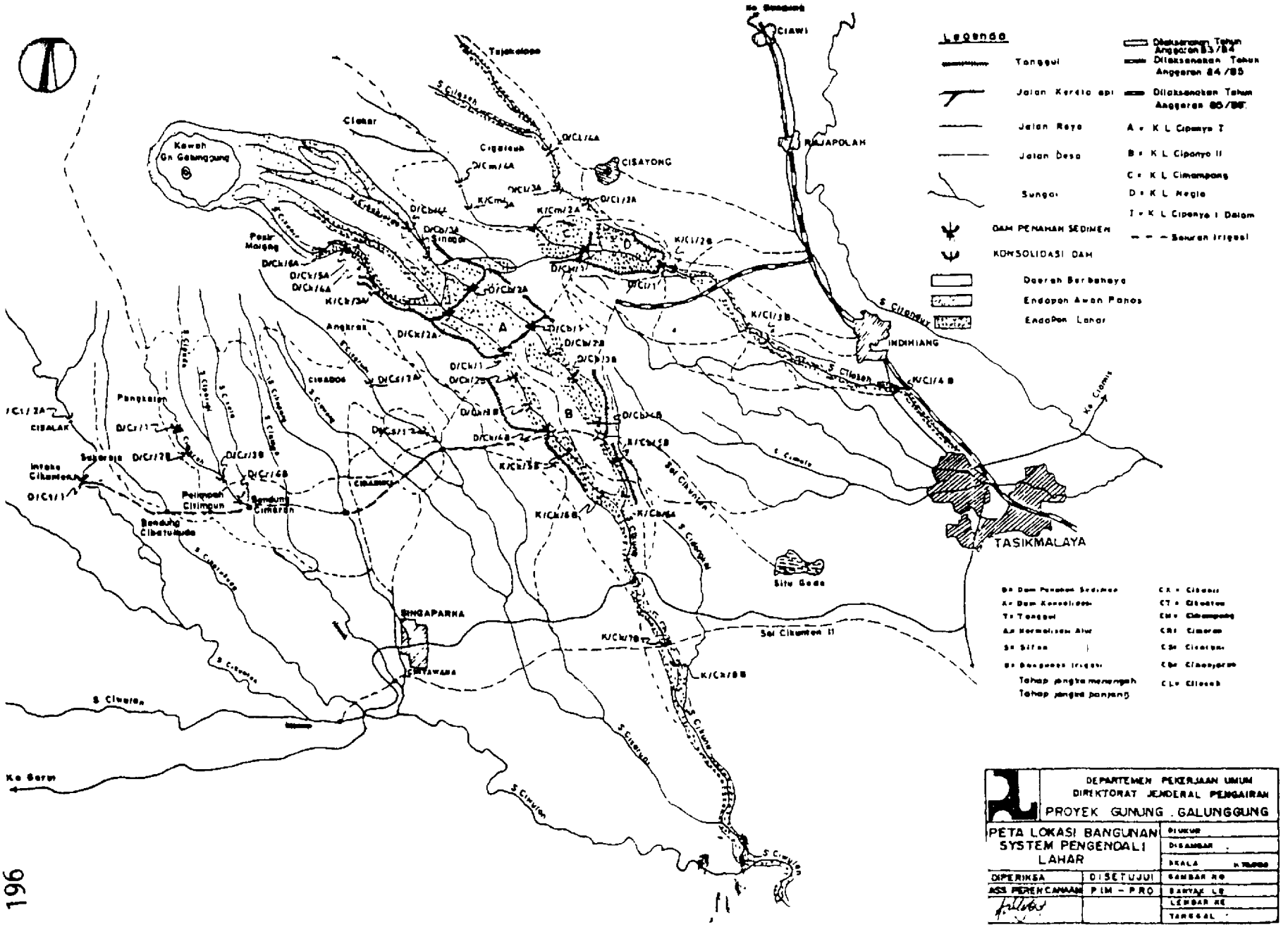


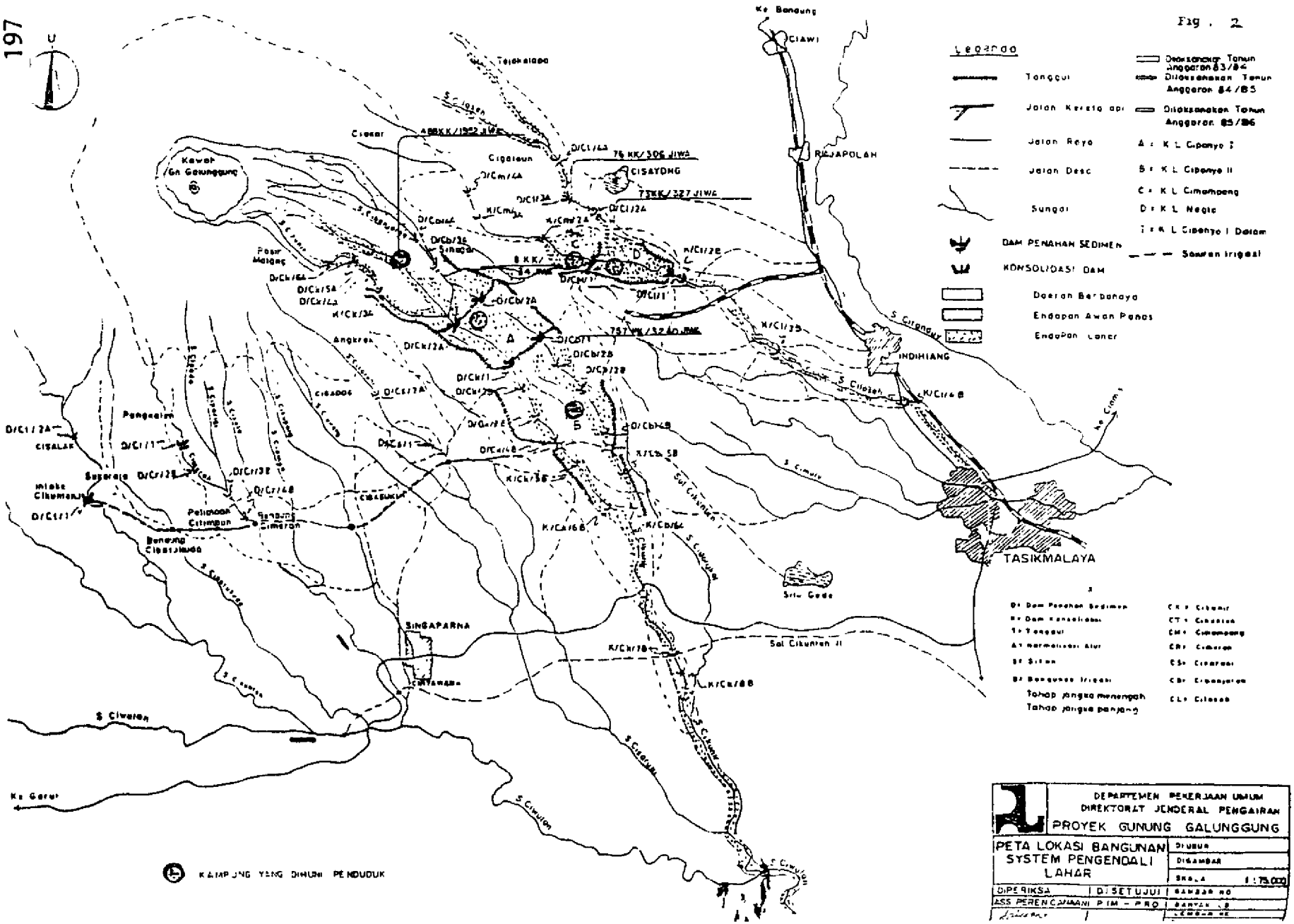
DEPARTEMEN PEKERJAAN UMUM
DIREKTORAT JENDERAL PENGAIRAN
PROYEK GUMUNG GALUNGGUNG

PETA LOKASI BANGUNAN SYSTEM PENGENDALI LAHAR

		DIUKUR
		DIGAMBAR
		SKALA 1:75000
DIPERIKSA	DISETUJUI	GAMBAR NO
ASS PERENCANAAN	PIM - PRO	BANYAK LB
		LEMBAR KE
		TANGGAL

196

Fig. 2



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DIREKTORAT JENDERAL PENGAIRAN
PROYEK GUNUNG GALUNGGUNG

PETA LOKASI BANGUNAN SYSTEM PENGENDALI LAHAR

DIUBUH
DIGAMBAR
SKALA 1 : 75.000

DIPERIKSA | DISETUJUI | GAMBAR NO
ASS PERENCANAAN PIM - PRO | BANYAK
LEMBAR KE