Shelter Design and Development for Resettlement.

Resettlement for Mud-Volcano Disaster's Victims in Porong, Sidoarjo, Indonesia

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Shelter Situation Analysis

Basic General Data

Indonesia is the fourth most populous country in the world after China, India, and USA. It consists of 221.9 million people (cencus 2006)[1], 60% or more than 133 million people lived in about 7% of the total land area on the island of Java. The Indonesian area is 1,904,443 km². It consists of nearly 18,000 islands of which about 3,000 inhabited. The biggest Islands are Java, Sumatra, Kalimantan, Sulawesi, and Irian Jaya.

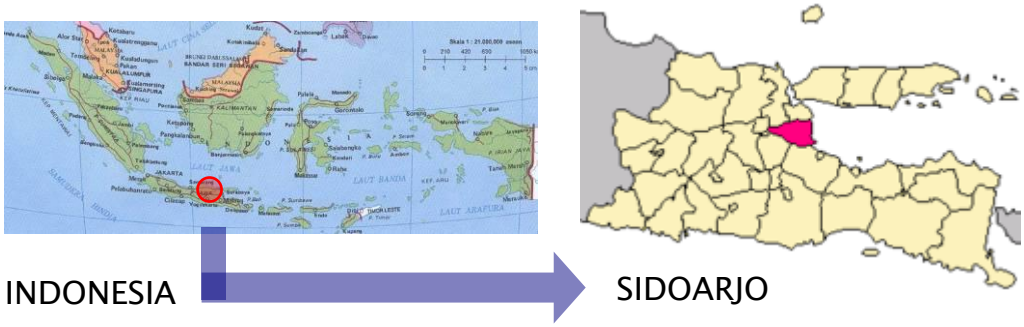


Figure 1. The map of Indonesia and Sidoarjo

[1] www.world-gazetteer.com, download July 20th, 2007

Sidoarjo is 23 km from Surabaya, the regional government of Sidoarjo regency was born on January 31,1859. It is from 112.5° and 112.9° east longitude to 7.3° and 7.5° south latitude. The regency is bordered on the north by Surabaya municipality and Gresik regency, on the south by Pasuruan regency, or the west by Mojokerto regency and on the east by the straits of Madura. The minimum temperature is 20˚ C, and the maximum one is 35˚ C.

As the smallest regency in East Java, Sidoarjo occupies an area of land of 634.89 km², it is located between the Surabaya river (32.5 km long) and the Porong river (47 km long) the land use is classified into the followings: Rice fields: 28,763 Ha, Sugar cane plantation: 8,000 Ha, Fishpond: 15,729 Ha. The rest are for the purposes of dry field industry and so on.

The regional government of Sidoarjo consists of 4 districts (Sidoarjo, Porong, Krian Taman), 18 sub district, 325 villages and 28 kelurahans (villages in urban areas).

Table 1. Population of Sidoarjo[2]

Year	Population (people)	Density (people per square kilometres)	Growth rate (%)	Sex ratio (%)
1971	716790	1,129	2.15	94.40
1980	916,781	1,444	2.75	9.,66
1990	1,252,637	1,973	3.17	97.80
2000	1,564,368	2,464	3.07	99.98

Porong is one of the regencies in Sidoarjo Municipal. Its location is very strategic in terms of regional land uses of Sidoarjo. Based on the regional plan, core of sub development region III for Sidoarjo is in Porong with the main activities for agriculture and industry, there are several main roads across Porong such as secondary collector, and middle ring road (planned), access between inner eastern ring road, outer eastern ring road, toll road and railway.

The Fact

In May, 28th, 2006, a mining technical failure occurred for the very first time in Porong, Sidoarjo Municipal, particularly in Banjar Panji well. The failure initiated e eruption of the mud volcano which produced mud flow of 25.000 m^3 per day. Subsequently, there are two others explosion in June 1st and June 2nd. Both worsened the situation in Porong until now.

[2] www.jatim.bps.go.id, download July 20th, 2007

Figure 2: Before Mud-Volcano erupted

June 2006, temporary pond is made to localize the mud particularly in the areas of housing. But, the mud has already flooded the areas of about 18,4 ha in two villages (Jatirejo and Balong Kenongo). The northern part of border is the toll road.

February 2007, mud flooded 10.426 houses in 4 villages, 23 schools, 2 offices, 24 factories, 15 mosques. It also flooded several areas such as 64.015 ha of sugar cane areas, 299,70 ha of rice field, threatened 7.000 ha of shrimp cultivation areas, etc. A secondary collector road in Porong is very important in connecting the northern and western part of East Java and the southern and eastern part of East Java. It is very important in transporting major tourists to the southern part of East Java's tourism sites and major export goods to the sea port in Surabaya.

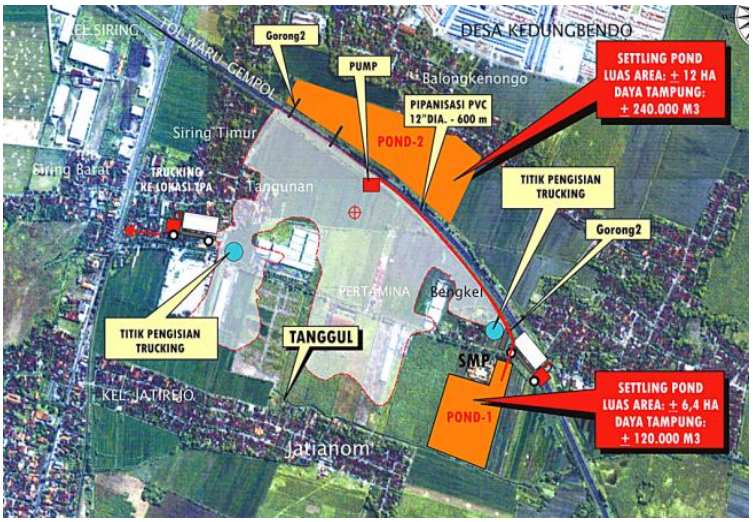


Figure 3: 2 month after Mud-Volcano erupted

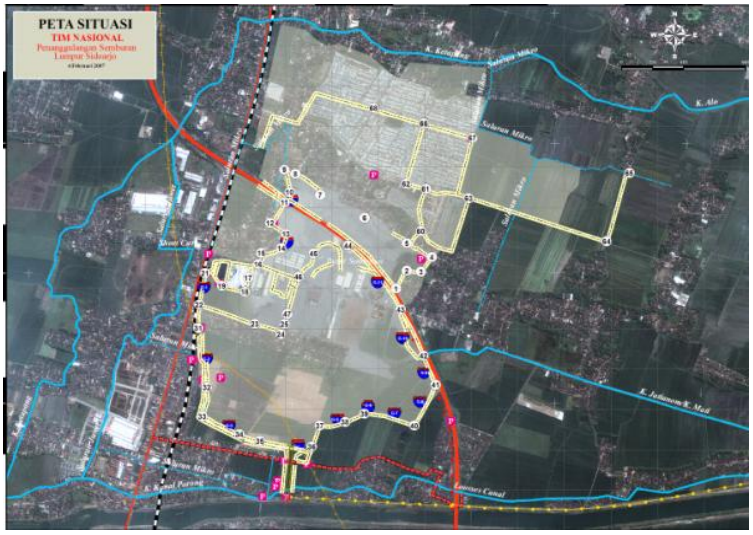


Figure 4: a transformation of flooded areas from June, 2006 until February 2007

Shrimp cultivation in Porong is also one of the best producers in the world as it uses natural farming system. After Banjar Panji Well explosions, most of the areas were flooded by the mud.

No	Structure Component	Sub category	Checklist per Periode								
			Jun	Jul	Agst	Sept	Oct	Nov	Dec	Jan	Feb
1.	Concrete structure										
	a. Main roads	Toll road	√	√	√	√	√	√	√	√	√
		Collector road	√	√	√	√	√	√	√	√	√
		Rail ways	*	*	√	*	*	*	*	*	*
	b. Main land uses	Agriculture	√	√	√	√	√	√	√	√	√
		Industry	√	√	√	√	√	√	√	√	√
		Housing	√	√	√	√	√	√	√	√	√
		Commercial	√	√	√	√	√	√	√	√	√
		Public facilities	√	√	√	√	√	√	√	√	√
		Mix Use	√	√	√	√	√	√	√	√	√
		Green open space	√	√	√	√	√	√	√	√	√
	c. Height of several buildings		√	√	√	√	√	√	√	√	√
	d. Other infrastructures		√	√	√	√	√	√	√	√	√
2.	Imaginer structure	Interrelation among dwellers	X	X	X	X	X	X	X	X	X
		Social conflict	-	X	X	X	X	X	X	X	X
		Changes on social atributes	X	X	X	X	X	X	X	X	X

*Source : analysis based on PSB (Disaster Research Centre) of ITS documentation **

No	Land Use Pattern	Sub Category of Land Use Pattern	Proses Checklist per Periode								
			Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb
1.	Agriculture	a. Agriculture in wetland	√	√	√	√	√	√	√	√	√
		b. Agriculture in dryland	-	-	√	√	√	√	√	√	√
		c. kawasan tanaman tahunan/perkebunan	√	√	√	√	√	√	√	√	√
		d. Livestock	√	√	√	√	√	√	√	√	√
		e. Fisheries	*	*	*	*	*	*	*	*	*
2.	Industry	a. General Industry	√	√	√	√	√	√	√	√	√
		b. Warehouse	√	√	√	√	√	√	√	√	√
3.	Housing	a. Row houses	√	√	√	√	√	√	√	√	√
		b. Non formal Housing	√	√	√	√	√	√	√	√	√

Source : analysis based on PSB (Disaster Research Centre) of ITS documentation *

* Notes :

(√) = Impacted directly (flooded)

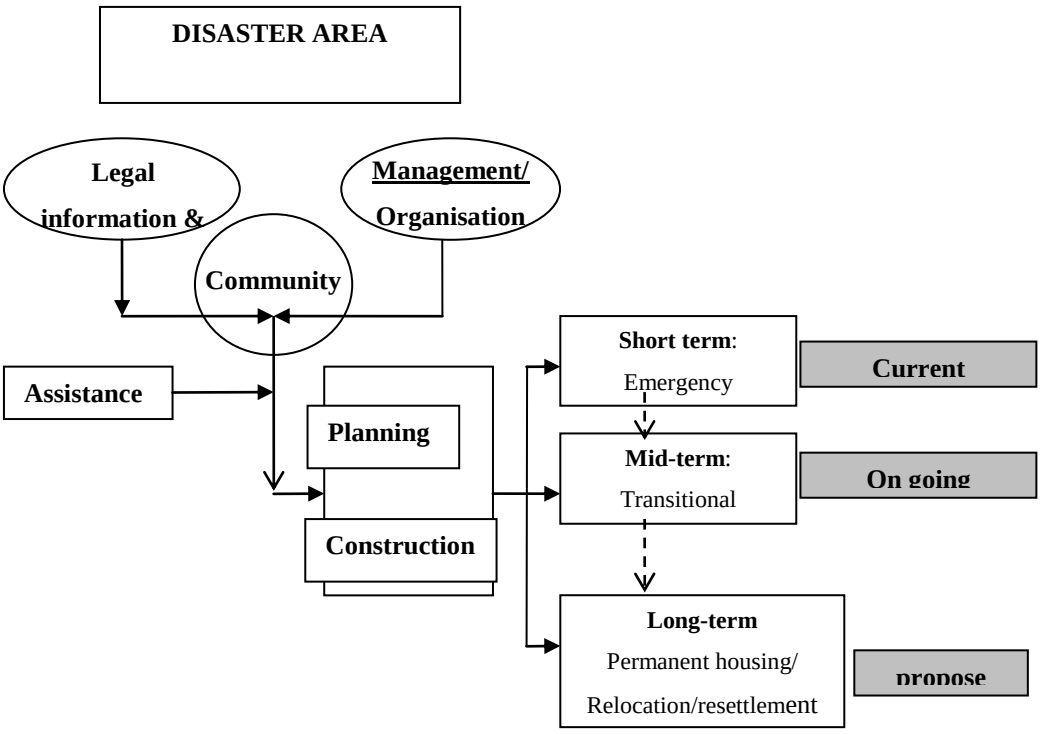
(X) = Impacted indirectly

(-) = unimpacted

(*) = Threaten to be impacted

Housing Policy

Indonesia is prome to disasters and since the tsunami and earthquake in Aceh and Nias in 2004, it imposed standards and regulations for the victims :



However, the most important thing is that in undertaking this activity there should be an organisation or management that will manage the whole process of development, not only the design process, but also the other activities such as building community awareness and assistance, arranging property appraisal, and managing the construction and post construction/rehabilitation process.

On the other hand, the Indonesian Regulation, the 4th version of 1992 is the arrangement of National and Strategic Policies on Housing and Settlement, consisting of:

- The policy of developing and institutionally strengthening housing and settlement.
- The housing provided for poor and low income inhabitants.
- The development of a clean, safe, healthy, harmonious and sustainable environment.

A specific example of this arrangement is the 1:3:6 rule. When private sector companies build one high cost house, they have to build three medium cost and six low cost houses. This policy was implemented to provide for the housing need of the community. On October 9th, 2003, the government of Indonesia made the commitment and set the target to provide one million housing units for the low-income families in all provinces of Indonesia. It is assumed that one family would

stay in one house, hopefully one million low income families would be able to live in their new built or renovated houses. The adequate living quarter is defined as the one having:

- An occupation rate of 7 – 9 square metres per person
- The land tenure security
- A good facilities and infrastructure, especially good access to clean water and electricity connection and good sanitation.
- A quality housing construction.

Actors in Shelter Delivery and their Roles

In terms of this specific disaster, a lot of institutions are involved therefore a specific management should be arranged in order to organise all activities that should be carried out. This management institution will coordinate all the activities thoroughly, since every step of each department should anticipated and responsed by other department. The owner/explorer is PT Lapindo Brantas Inc. that in generally they don't want to take all of the responsibility of the victims. They are the private sector that only think a business. They assumed that it caused by the earthquake on Yogyakarta in May 27th, 2006, one day before the mud volcano had been erupted. They should be organised in overcoming the disaster is not only how to stop the explotion and handle the mud-volcano's flow and its impact, but also be concerned of the victims sorrow. Local government and Provincial government provide regulations for the victims for relocating and concerning distribution, development, and planning. The research institutions are doing research and helping the government to make data for the beneficiaries and also give an opportunity on all housing aspects, the level of the housing need fulfilment, and the adequateness of infrastructure. Research institutions also do research on predictions of needed housing in the future to achieve a better living environment. The Non Government Organisation are doing community development. The choice of each department's activities should also be the essential contribution for the other.

Shelter Design

An assumption is that all victims will have a house and its support will lead to the designer to plan the settlement as it was essentially. This condition will need an

agreement between the communities and the corporation. Four things in particular things could influence the design process:

Land

The width of land that is needed by each of houses should equal to the width of their previous land. The land should equip with its infrastructure and public fascilities and other fascilities that rise during the discussion session between communities and the teams.

Housing Typology

The main requirement that needed to be in agreement is that the quality of housing should be a new home where the family could make an adjustment in the new environment. This could be started by involving those familiy in the planning and construction process. Furthermore, this house will be a home when the familly is also involve in the process of its development to be a new home as they wish for, consequently this house could be a core house that could be expanded as they wish without any problems. Therefore any type of houses could be taken into consideration not only those that offered by any industrial unit, but also if the communities would like to construct it by themselve. The most important of the development is the process.

Infrastructure

The infrastructure and public fascilities that should be part of the design are the one that they have alredy had in their previous settlement, along with those that should be provided by the public work department's standart.

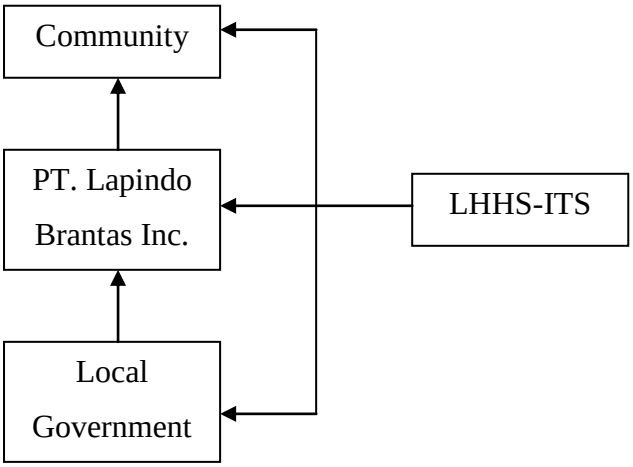
Time

It can not be predicted the length of the agreement process, since it depends on the discussion and the negosiation process, however it should be persuaded that the building construction should be around 3 to 6 months without land acquisition and preparation.

The Laboratory for Housing and Human Settlements

The Laboratory for Housing and Human Settlements (LHHS) which is a part of the Institute of Technology Sepuluh Nopember (ITS) Surabaya, Indonesia tries to

improve the housing situation of low income people in Indonesia especially Surabaya. The projects of the laboratory take place in the field of community development, urban planning, policy design and assessment and appropriate housing design. Some specific examples of these projects are the Kampung Improvement Program in which living conditions and housing were improved in low-income areas (kampungs), the design of a master plan for Surabaya city and the development of building codes for post-tsunami Nangroe Aceh Darussalam and Nias and right now LHHS involve to make a better solution for the victims in Porong with a new resettlements.



Shelter Problem

The burst of mud volcano from Lapindo Brantas's Banjar Panji 1 exploration well in Porong-Sidoarjo have been drowning, flooding more than four others settlements and still threatening broaden area and utilities surrounds it. Thousands housing have vanished along with their rhythm of life and established social setting. Up to 8 months after its eruption on May 2006, nobody could predict when will these mud volcanos be stopped and those drowned area could be used again. These uncertainties are distressing communities in that area. As United Nation Centre Human Settlement's ratification stated that safety and life are two of the fundamental rights, therefore rescuing people as a main issue on dealing with this disaster is a must. The most important thing dealing with housing and settlement problem is housing and settlement replacement.

Various approaches on resettlement, profoundly revealing on social aspect, have been studied and compared in order to enlightening suitable alternative for the case

study. At least there would be three types or steps on housing enhancement for this kind of disaster, depence on the pressure on each area.

After the mud volvano was erupted, dwellers and factories (the victims) asked for the compensation to Lapindo. In June, the mud affect the regional transportation system such as toll road and rail way and what happened, Lapindo refuse to pay the compensation because they assumed that the mud volcano was caused by the earthquake on May 27th, 2006 before. Local government ask for national commitment about this disaster and Vice President of Indonesia stated that Lapindo should responsible for the effects of mud volcano. Since that, horizontal conflict was happened among dwellers and vertical conflict between dwellers and Jasa Marga (toll road operators) in relation of mud flow through drainase system. On August,

the victims asked for compensation money for dweller in the form of housing rent and food allowance and Mindi villagers asked compensation for their flooded rice field and turning it into ponds. PT PLN (national electric company) asked for compensation of their utility and loss of customers.

The current situation in Porong righ now that the emergency housing is the initial aid that should be arranged for the first category of disaster. It was a direct place to live in away from the disaster area. In this place the upset victim will be support by adequate space to sleep, food to eat and other basic services.

The basic principle of this emergency housing was that it could be built in a hurry and can be used as a multi purpose building. Therefore, the building could be build in a limited times (by means of its simple construction, such as using a modular arrangement with regular services, local material and standard equipment), and temporary used. The basic building could be used as houses, school, district office, health centre, market, mosque, without specific character, in preference, that everybody could build without specific ability.

Physically the building could be as simple as military barracks. This type of housing will help people to regain their self-control, but will not assured their contentment, therefore victim could not stay in this condition more than their psychological level of serene. Moreover, this supportive condition will, unfortunately, trigger the tendency of laying down their arms and create an indolent community.

In this disaster, the local disaster taskforce guided victims to stay in their own district community halls or in the unoccupied new market (Pasar Porong Baru). Unused buildings, barracks, tents, district community halls (balai desa), are some of the best choices in this situation, but should be equipped with standards basic services, such as public toilets, and public kitchens (dapur umum).

As part of social task team from LHHS-ITS, researcher rearrange some lots of Pasar Porong Baru as an emergency housing. The lots were planned into some plots constructed by plywood sheet which could accommodate at least one family with or without their relative. These plots were equiped by additional public toilet.

Actually the existence of the plots/temporary dwellings could help victims to soothing themselves and help to find their future life after going through the catastrophe. However, the concept of this temporary dwelling did not get reach the aim as, only a few were constructed and what is more, some of those plots were only planned for couple who would like to have privacy. However, those who occupied the plots were pleased, and as a result were happy for awhile. A note that could be drawn from this condition is that people should have to have assurance that their life will continue, although it’s in limited conditions.

On September, Mindi villagers wanted to push the mud into Porong river. Conflict between Lapindo and dwellers (particularly from shrimp farmers) ensued as the

dwellers refused the operation of relief well, pumping system, piping to Porong river. Fishermen and shrimp farmers refuse for flowing the mud in the river .

On October, Mining Minister decide to flow the mud to the sea through Porong river that made horizontal conflict among dwellers, shrimp farmers, fishermen, NGO in relation to Mining Minister's decision. On December 22th, Pertamina's (national oil company) pipe exploded and toll road was closed. Villgers from Siring, Renokenongo, Kedungbendo asked for compensation on the mechanisme of cash and carry, Rp. 2.500.000 (US$ 275)/m2 for land and building, Rp. 120.000 (US$ 15)/m2 rice field. Villagers from Jatirejo asked for compensation on the mechanisme of cash and carry for about Rp 3,5 millions/m2 . Conflict between Lapindo and dwellers in relation to compensation requierement (the land should be have ownership certificate (SHM))

January 2007, Lapindo commitment on compensation that yards = Rp 500.000 (US$ 55)/m2, buildings = 1.250.000 (US$ 140)/m2 and rice fields =Rp 90.000 (US$ 10)/m2. Land with local certificate (Petok dan Letter C) can have compensation. It made dwellers of Perumtas I demonstrate as they are excluded from affected areas of Mud Volcano. On February, uncertainty and late payment of compensation made dwellers blockade the main roads and rail ways to protest the uncertainty payments.

Proposal for Change and Improvement

Compensation payment

The current situation in Porong needs an alternative approach in solving the housing problem. Giving the people a compensation payment (but always is not a better solution) however showed that at the long term, it will always unsatisfy the victims. This condition can be understood when we think of how could the loss of the establishment be defined by the amount of money lost, the loss of home which is not only houses, also occupation which is not only a job, and especially the loss of the social network. Furthermore, how could someone estimate the loss of business opportunity that was available in their previous environment? Even the method of 'cost-benefit´ analysis will not be able to estimate the loss people's economic and social values.

Lapindo's choice to give some money as a rental fee to the victims is also an alternative choice to solve the problems. However based on the widespread affect of the mud-vulcano devastation, the possibility of people loosing their social network was expected. This social-network loss can inflict discomfort among citizens which probably will be one of the main reasons of the peoples refusal to be moved or relocated.

Right now, the company just gave 20% of the compensation to the victims that lived in some of the villages.

Resettlement

Some of the issues related with housing development are:

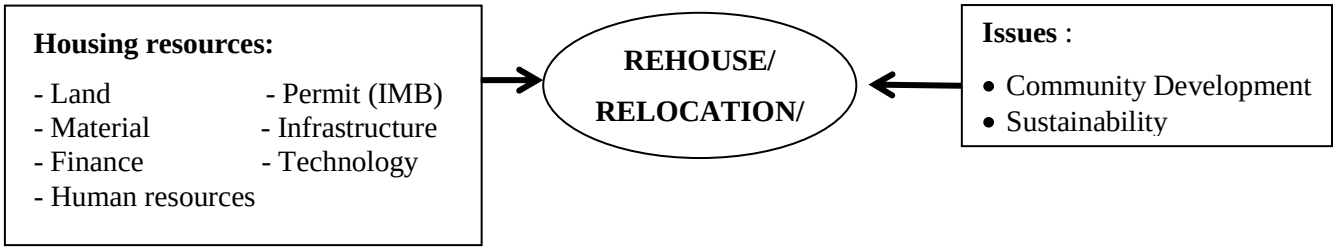
- The displaced people are those who actually do not want to change their environment. They are forced to leave their beloved village that contains a lot of their memories and life history.
- The loss of these communities is as immense as the loss of those who have to leave their countries to get an asylum, or to save their life from a natural disaster.

In planning the victims' housing or settlement, the authority should not only be concerned with housing resources, but also of other supporting issues such as community development, and the living sustainibility. Housing resources (Turner, 1979) will include affordable land, availability of materials, accurate finance, appropriate technology, approved human resources, and adequate infrastructure. These seven aspects should comprehensively support the alternative plan.

Other issues on community development can actually give opportunities to the community and the committee/management to explore more appropriate design in terms. The importance of recognizing the community's aspiration to have immediate response and supportive design processes.

Simultaneously, attention to the living sustenance assists the committee and management in understanding the community's living condition, custom and social network. This action is expected to reduce community uneasiness, anxiety and build up their self-confidende.

The structure of consideration and plan could be described as below:



Permanent Housing is the main aim in order to help the people to settle themselves. In this case, permanent housing can be obtained through the relocation process. This relocation process of course must concider social safety and comfort. This resettlement process approach needs very accurate and detailed planning. Some very important issues must be concidered in the resettlement process, especially in involuntary resettlement case like in this. These issues are:

- Every type of permanent housing alternative plan should be presented to the community (including a land-based housing option). Especially for the specific

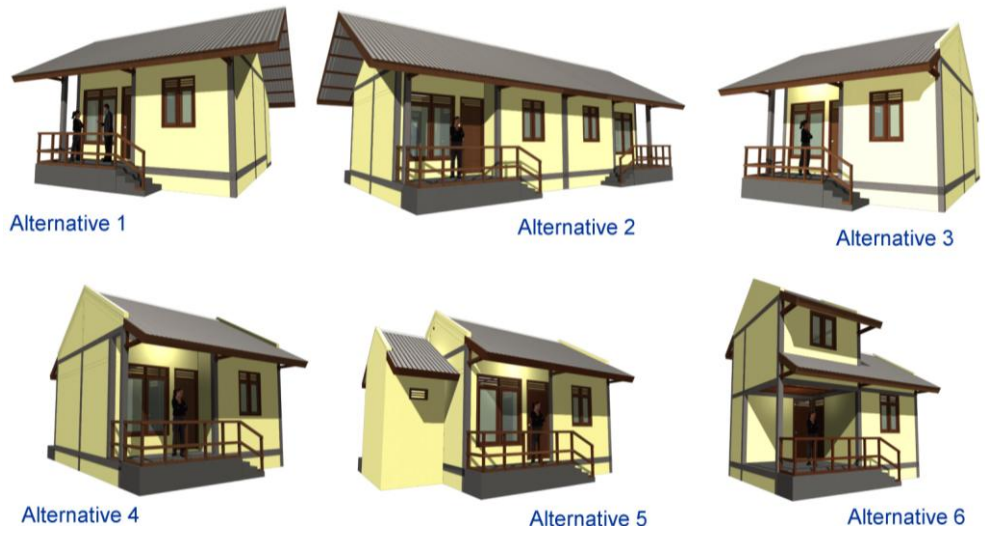


Figure 6. the alternative houses for resettlement

communities who are displaced from their productive land and who do not have any alternative occupation after the tragedy. For these farming communities, the resettlement process should include the posibility of arranging their future productive land for all the experience also showed that cash compensation will not be enough to pay for all the damages.

- The people who will inhabit the new settlement have to be served by sufficient fascilities and infrastructure, at least like those that they had before or better.

- A holistic analysis of probable project alternative should be done in order to identify the actual problematic, especially for these involuntary resettlements.
- If the existing land is not enough, the posibillity of resettlement will be a non land-based. Offerring opportunity for employment will be another option, it could be a formal occupation or a private business. Hopefully the cash compensation will substitute to their loss.

It assumes that the house could be inhabited by the victims as a replacement house. Therefore data is a key point for the basic work. The comprehensiveness of the data will bring about an exceptional design for the community. Moreover, for getting a good agreement among stakeholders in this process, there should be an independent appraisal team.

The LHHS – ITS Surabaya, Indonesia, would arrange a scheme of the program, and evaluation process with the community and local government, all together to maintain the sustainability of the project.

The recommendation as below cannot be implemented without agreement of the community therefore there is a need for the community participation. Based on the analysis the following are recommendations for a better resettlement program :

Community Development

Considering the effect in community of disasters community focused development approach to solve the housing problem is needed.
For that purpose also community participation are needed to guide the citizens in this process.

Beneficiaries Data

Accurate data on the victims, damaged public and private properties are needed. This data are the basic to every action table to solve the housing problems. This data should also include the residents of family and family members living in the house, the physical characteristics of the structure, the area and the tenure/legal status.

Land/location

If relocation of the disaster victims is needed the area of relocation should not be against the city’s development plan. Land price is a major consideration. The land development and infrastructure construction can be separately arranged through

contractor. The contractor should make the land available for building as soon as possible, so the victims can build their houses as soon and as easy as possible.

Village Plan

Relocation has a distinct advantage in the planning aspect. Through relocation it is possible to plan for a better place for the victims compared to their original. For that village plan is very important in the relocation program of resettlements that involves the community.

Construction process

In implementing and supervising the building process, a community-based or contractor based approach can be used. Both approaches have distinct advantages and disadvantages such as the corruptions of the materials, the way to build a good houses.

Utilizing an existing residential/developments area

Low-income residential developments/real estate dents near the disaster area can be used as the relocation site. Of course a investigation and negotiation must be made to arrive at a good agreement. The approach to this type of relocation is very different to the community-based approach. As it needs special attention on specifically on peoples social-economic behavior which will probably need a little adjustment.

Financial

The finance source has a big influence in the whole process. The fact that every finance source usually has special conditions that must be fullfiled in using their money creates quite a problem.

Conclusion and Recommendation

Based on the above assessment and analysis, we can be concluded that:

- Disaster happens in a continuous manner, which increases the level of stress of stakeholders particularly residents therefore, there is a need to stop or localize the mud flow.
- Impact on land use do not only affect private land which can be solved by compensation but also to the land use structure and activities. Consequently, stakeholders should also consider others main problems such as toll roads, delay cost, losses of economic opportunities and losses of social linkages among different groups of dwellers.

- The conflict was unpredictable caused by low level of conflict management. The situation is directed to private land compensation but is not enough in repairing the land uses system.
- A good solution is rebuild by relocating all of the residents in the village to a place where they can permanently their community.

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