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Consequences Of Post-Disaster Policies On Building Process Of Permanent Shelters In Mentawai Islands Indonesia

Nasfryzal Carlo [1], Eva Rita [2*], Suryadi Eviontri [3]

[1] *Professor, Department of Civil Engineering of the Faculty of Civil Engineering and Planning and Bung Hatta Center for Environmental Studies, Universitas Bung Hatta, email: carlo@bunghatta.ac.id*
[2] *Lecturer, Department of Civil Engineering of the Faculty of Civil Engineering and Planning and Bung Hatta Center for Construction Management, Universitas Bung Hatta, email: evarita@bunghatta.ac.id*
[3] *Regional Disaster Management Agency of West Sumatra Province, email: os_suryadi@yahoo.co.id*
[*] *Corresponding author – Eva Rita, evarita@bunghatta.ac.id*

Abstract:
Implementing the policy of relocating people affected by disasters is a complicated process because it requires land preparation to build houses that are ready for habitation. Land and house building processes are critical to a successful relocation. This paper examines how relocation policies were implemented in building houses and providing land for relocation for victims of the 2010 earthquake and tsunami in the Mentawai Islands, Indonesia. Through field observations, literature studies, and planning documents related to relocation policies and interviews with policymakers, community leaders who participated in building permanent housing in 8 villages and 41 hamlets in the Mentawai Islands. This study provides evidence to investigate how the implementation of the relocation policy in providing land and building permanent housing. Providing relocation land takes a long time due to the land being managed by private parties with permanent production forest status. The status of production forest still has to be changed first to conversion production forest and then to another use forest. Changes are made by exchanging forest areas. Building housing continues to be carried out by involving the community by forming community groups to create cooperation and help each other in a "Rob Parob" manner. This research is limited to the implementation of relocation policies and the process of building permanent housing. This study can be an essential reference for planning post-disaster relocation of residents in other disaster-prone countries. Challenges faced in the implementation of relocation policies and building permanent housing on permanent production forest lands for residents affected by the disaster.

Keywords: Mentawai Islands, post-disaster, permanent settlement, relocation policy, land provision, rob parob, community groups.

Introduction:

After the Aceh earthquake and tsunami in 2004, the movement of the Indo-Australian Plate and the Pacific plate around the western region of Sumatra became a more serious concern for scientists such as Natawidjaja et al. (2006), Sieh et al. (2008), McCloskey et al. (2008). Pay attention to the plate movement because it has the potential to cause earthquakes and tsunamis in the Mentawai archipelago, which is called the "Mentawai megathrust." Historically, the waters of western Sumatra have had a very high level of seismicity (Putra and Mutmainah, 2016). These earthquakes are generally associated with the Sunda subduction system as the relative movement between the Indo-Australian Plate and the Eurasian plate can produce a relatively large and destructive tsunami (Sieh et al., 2008; Mutmainah et al., 2016).

The earthquake on October 25, 2010, measuring 7.7 Mw at coordinates 3.29° South

Latitude; 100.7° East longitude with an epicenter depth of 20.6 km is in the Indian Ocean (Yudhicara et al., 2010; Satake et al., 2012; Putra and Mutmainah, 2016). This earthquake has triggered a tsunami wave and impacted the western and southern areas of the Mentawai Islands Regency. The tsunami waves reached a height of 3 m above sea level with a slope that entered the land up to 1 km from the coast (Pusdalopsumbar 2012; Eviontri, 2020; Rita et al., 2020). Four sub-districts experienced the most significant impacts; North Pagai, Sikakap, South Pagai, and South Sipora sub-districts in 8 villages and 41 hamlets (Eviontri, 2020; Rita et al., 2020). The death toll was reported as 509 people died, 91 were missing, 173 were seriously injured, 325 were slightly injured, and 16,066 people fled to find a safe place. In addition to human casualties, there was also damage to houses. As many as 879 units were heavily damaged, 104 units were slightly damaged, educational facilities and houses of worship, and several other infrastructures (Eviontri, 2020).

Based on the condition of the villages and hamlets affected by the tsunami, it is no longer possible for the affected communities to return to their original locations. Residential areas are located at an altitude of 1-4 m above sea level and are very vulnerable to tsunamis (Eviontri, 2020). To avoid and reduce vulnerability from the tsunami, the government took a policy to relocate as many as 2,072 households from 8 villages and 41 hamlets to safer places (Eviontri, 2020; Rita et al., 2020).

Relocation is a strategy to reduce the hazard of vulnerability to the environment (Ajulo et al., 2020; Choi and Honda, 2019; Iuchi and Maly, 2016; Maly et al., 2015; UNHCR, 2014; Perry and Lindell, 1997). The relocation process is expected to not only restore the original condition but become an opportunity to provide better facilities and services (Yatmo et al., 2021). Relocation is a general policy widely adopted in disaster recovery in both developed and developing countries (Chen et al., 2020; Maly and Ishikawa, 2011; Perry and Lindell, 1997). In Japan, relocation is a mitigation program to reduce disaster damage to residential areas (Maly and Ishikawa, 2014; Danar and Pushpalal, 2014), and in many countries, relocation is an effort to reduce disaster risk in the future (Achmed, 2111). Relocation to coastal areas that experienced a tsunami or typhoon disaster is often a significant consideration, such as relocation in Aceh and Nias, Indonesia, after the 2004 earthquake and tsunami (Iuchi and Maly, 2016; Presidential Decree No. 30 of 2005), and relocation in Tacloban city in the Philippines, after Typhoon Haiyan or more popularly with Typhoon Yolanda in 2013 (Cuaton, 2019; Iuchi and Maly, 2016). The relocation process can adopt the concept of "Build Back Better," which will reduce vulnerability to disasters and at the same time increase community resilience (UNISDR, 2010; Neeraj et al., 2018) as well as prevent death and as a means of mitigation (Perry and Lindell, 1997).

According to the World Bank, relocation is the process of rebuilding community housing, assets, and public infrastructure in another location by providing a framework of principles that can contribute to the success or failure of relocation (Jha et al., 2010; Maly and Ishikawa, 2014). Several things that were emphasized in the rebuilding process were that relocation was a last resort, it was necessary to involve the affected communities in every decision-making (UNHCR, 2014), and to prevent the relocated communities from returning to their old locations (Jha et al., 2010; Malyand Ishikawa, 2014).

Some relocation projects failed, for example, in Turkey (Varogüneş, 2021; Maly and Ishikawa, 2014). After the earthquake in 2000, new settlements built were rejected by the community due to the government's hasty decision-making process, lack of participation and communication with beneficiaries. (Dikmen, 2006). Maly and Ishikawa (2014) also revealed that the lack of coordination caused the failure of the relocation project in Sri Lanka after the 2004 tsunami because it left the prevailing habits of beneficiaries who liked to fish and raise livestock as before the disaster (Jha et al., 2010). In addition, the quality of the houses built below standard, the work carried out in a hurry, lack of planning, and the existence of political and interest complications are the failures of relocation in Sri Lanka (Choi and Honda, 2019).

Iuchi and Mutter (2020), revealed that the relocation policy Community policy is unwelcome and challenging because it interferes with the lives of previously established people, income disturbances occur (Seraniraya, 2015; Bawole, 2105; Iuchi, 2010), financial burdens and erodes people's social networks (Iuchi and Maly, 2016) as well as social disturbances on livelihoods (Maly and Ishikawa, 2014), and social complications occur (Raju, 2013). Even the relocation resulted in two victims losing their families and homes due to the disaster and then being forced to move to a new place (Lyon, 2009). However, relocation creates new social cooperation (Bawole, 2015). However, relocation to coastal areas is more considered after major disasters occur and damage and cause losses such as Typhoon Yolanda in the City of Tacloban Philippines in 2013 (Iuchi and Maly, 2016), and the earthquake and tsunami disaster in the Mentawai Islands in 2010 (Eviontri 2020; Rita et al. al., 2020).

The supporting factor that needs to be considered for a relocation policy, recommended by the World Bank (Maly and Ishikawa, 2014) is the participation of citizens in planning, design, and construction to support the creation of housing that suits their needs, including culture and economic structure and social environment (Varolgünes, 2021), and locations that are close to the livelihoods of the relocated people. Chen et al. (2020) further reveal that the factors that influence the success of relocation are, among others, related to the land provision, accessibility, and access to water sources and other natural resources; layout (for cultural considerations, kinship groupings, environmental groups and space requirements for domestic livelihood activities); housing design (covering construction materials, temperature protection, and privacy maintenance) and community participation in planning. Without paying attention to this, it turns out to cause problems of economic and social vulnerability (Chen et al., 2020; Bawole, 2015; Barenstein, 2015). Community involvement from the start will develop a sense of ownership (Chen et al., 2020; Jamhsed et al., 2019; Jamshed et al., 2018; Bawole, 2015).

In some places, the relocation project was considered very successful, such as in a fishing and agricultural village in the city of Ohfunato, Japan, relocation by moving people from the lowlands to higher lands after the Meiji Sanriko Tsunami in 1896 (Danar and Pushpalal, 2014) and no damage was done to the These settlements were caused by the 2011 Great East Japan Earthquake and Tsunami. The relocation in Southern Thailand was also considered successful through community-based relocation (Ahmed, 2011; Maly and Ishikawa, 2014). The relocation of communities due to the eruption of Mount Merapi in Yogyakarta was also considered successful through the REKOMPAK (Community-Based Rehabilitation and Reconstruction Settlement Project) program (Maly et al., 2015; Bawole, 2015; Nainggolan et al., 2021), where there has been a collaboration between the government and the community. This is affected by the spirit of cooperation and the growth of new settlement sites (Iuchi and Mutter, 2020; Nainggolan et al., 2021; Bawole, 2015, Danar and Pushpalal 2014).

Relocation with the reconstruction of resilient and safe settlements is an integral part of effective disaster risk reduction (UNHCR, 2014). It is an essential part of the conventional disaster risk management cycle (Maly et al.,

2015). The practice of physically moving people is not easy (Iuchi and Maly, 2016) because planning and adjustments are needed to the situation and field conditions (Bawole, 2015).

Focusing on post-disaster relocation policies, this article aims to understand the land provision, planning, and construction of permanent housing due to the policy to relocate victims of the 2010 earthquake and tsunami in the Mentawai Islands, Indonesia. There are not many publications on the implementation of relocation policies in the Mentawai Islands except those disclosed by Eviontri (2020) and Rita et al. (2020), and the process of providing land and building houses with a pattern of empowering community groups are essential reasons for this article to be published.

Methodology:

This research uses a qualitative approach by conducting descriptive-explanative analysis based on field surveys and participatory observations from the preparation stage to building permanent housing due to the relocation policy. The Mentawai Islands Regional Government and the West Sumatra provincial government have taken a policy of relocating the communities affected by the 2010 earthquake and tsunami by creating new settlements through the construction of permanent housing. The number of houses built by the number of relocated families was 2,702 houses. Desk evaluation was carried out on the relocation policy documents and their implementation in the field, starting from land planning to constructing ready-to-occupy houses. The relocation policy is stated in the action plan for constructing permanent housing (BNPB, 2010), which should start in the 2011 fiscal year and is expected to be completed in 3 years. However, the physical construction of permanent housing can only start on November 10, 2013, and end the following three years (Eviontri, 2020). Qualitative data in the form of semi-structured interviews were conducted with stakeholders. Policymakers and policy implementers consist of the Head of the Disaster Management Agency and the Head of Rehab and Reconnaissance Division of the Regional Disaster Management Agency of West Sumatra Province, the Head of the Mentawai Regency Management Agency, eight Village Heads, several community leaders who are directly involved in the process of building permanent housing. Informal conversations were also carried out during fieldwork by one of the authors directly involved from the beginning of the planning and relocation process. At the end of 2019 and early 2020, visits were made to several locations to conduct interviews with residents of permanent residences.

Research Locations:

Field observations were carried out in 8 villages and 41 hamlets spread over 4 sub-districts in the Mentawai Islands. In North Pagai sub-district there are 3 hamlets in Betumongga village, Saumanganyak village with 3 hamlets and Silabu village with 4 hamlets. In Sikakap sub-district there is only 1 village, Taikako with 2 hamlets, in North Pagai sub-district there are 2 villages, namely Bulasat with 13 hamlets and Malakopak with 5 hamlets, and in North Pagai sub-district there are 2 villages namely Basua with 6 hamlets and Beriulou with 5 hamlets. The map of the research location is shown in Figure 1.

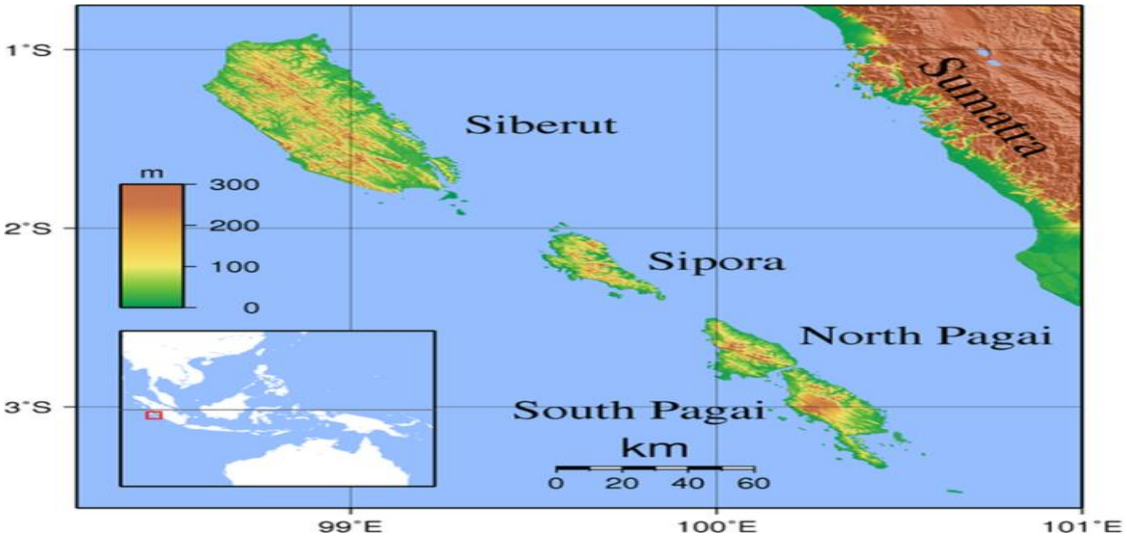


Figure 1. (Research location map)

Results and Discussion

Earthquake and Tsunami Impact and Relocation Policy:

An earthquake measuring 7.7 Mm occurred at 09.46 pm West Indonesia Time (UTC+7) Monday, October 25, 2010, was followed by a tsunami. The earthquake's epicenter was at a depth of 20.6 km in the Indian Ocean with a distance of 78 km from the Southwest of South Pagai Island (figure 2). The tsunami waves reached a height of 3 m with a slope of 1 km towards the mainland along the western and southern coasts of the Mentawai Islands (BNPB, 2010; Pusdalopsumbar 2012; Eviontri, 2020; Rita et al., 2020). The earthquake and tsunami caused 509 deaths, 91 people missing, 173 seriously injured, and 16,046 people displaced (table 1) and damaged 879 people's houses heavily, 104 lightly damaged, six educational facilities, seven houses of worship, and seven bridges (Table 2). Housing is the most valuable asset, and damage to housing elements and other facilities is expected of every disaster in developing countries (Ahmed, 2011). This housing damage is the most significant part of the overall loss of the national economy due to the disaster (Lyon, 2009).

For the Mentawai community, the house is a precious asset because the house is used as a place of refuge and meeting activities between families (Iswanto and Hamdani, 2015), a place to rest and store agricultural products (Eviontri, 2020). Therefore, temporary housing is needed during the emergency response period (October 26 to November 22, then extended to December 31, 2010), commonly known as temporary shelter for affected communities. The construction of temporary shelters in Pagai Selatan District, Mentawai Islands Regency, and its impacts have been reported by Rita et al. (2015) and Irwan (2015). Initially, temporary shelters were built to accommodate refugees whose houses were damaged by the earthquake and tsunami (Irwan, 2015). The number of temporary shelters built in all villages affected by the 2010 earthquake and tsunami was 1,855 units (Irwan, 2015; Rita el al., 2015).

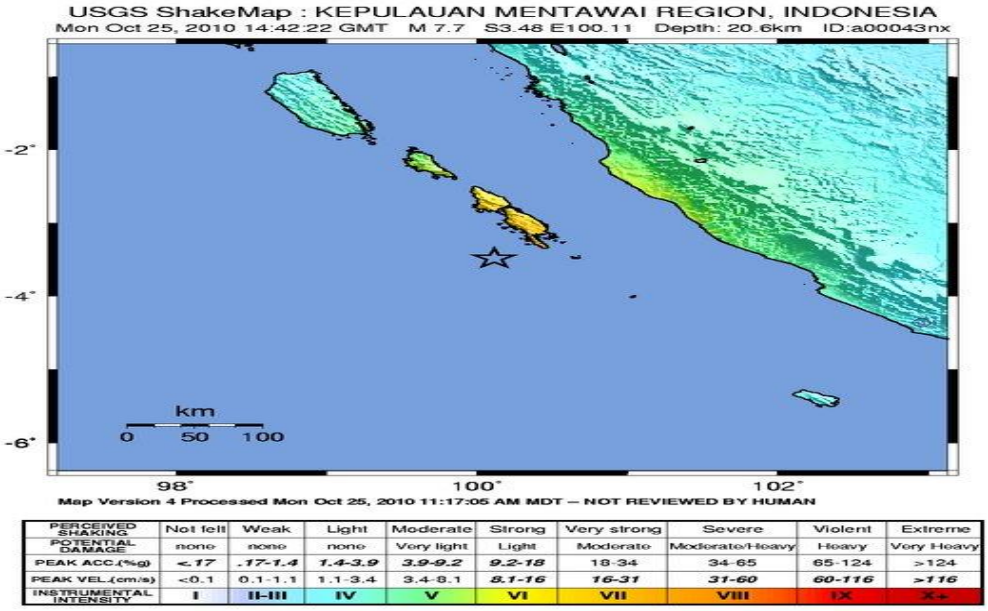


Figure 2: Location of the 7.7 Mw earthquake on October 25, 2010 in the Mentawai Islands

Table 1. Impact of the 2010 Mentawai earthquake and tsunami

No.	Sub district	Impact of earthquake and tsunami			
		died	missing	seriously injured	Displaced
1	Pagai Utara	292	71	71	2,751
2	Sikakap	10	-	-	1,764
3	Pagai Selatan	184	20	57	8,780
4	Sipora Selatan	23		45	2,751
	Total	509	91	173	16,046

Furthermore, it is necessary to build permanent housing during the rehabilitation and reconstruction phase by conducting reconstruction. The reconstruction site can be selected through two approaches: the existing site of damaged buildings as in-situ or the resettlement approach as building a new residential area in the form of relocation (Garakani et al., 2020). In some cases, disaster victims were relocated through resettlement programs (Ahmed, 2011; Bawole, 2015) and reconstruction (Garakani et al., 2020; Nainggolan et al., 2021).

The Mentawai Islands district government chose resettlement by reconstructing permanent housing for communities affected/victims of the 2010 earthquake and tsunami (BNPB, 2010). The relocation policy was carried out because the affected community's residential area was located at an altitude of 1-4 m above sea level, where this condition was prone to tsunami disasters in the future (Eviontri, 2020), and most of the houses in the in-situ area were severely damaged (Pusdalopsumbar 2012; Rita et al., 2020).

Table 2. Damage to facilities due to earthquake and tsunami in Mentawai Islands Regency

No.	Sub	Damage				
		to residential				
		heavily	damaged and slightly damaged	Education	house of worship	bridge
1	North Pagai	218	14	3	3	3
2	Sikakap	16	-	-	-	-
3	South Pagai	367	50	3	-	-
4	South Sipora	278	40	-	4	4
Total		879	104	6	7	7

The tsunami hit 1 km inland, hitting eight villages and 41 hamlets in 4 sub-districts. The average height of the affected area is 1-3 m above sea level, so the initial settlement is no longer suitable as a residential area (Eviontri, 2020). Based on the condition of the area, the Mentawai Regency government, together with the West Sumatra provincial government, took a policy to relocate the affected population to a higher area and is estimated to be safe from the threat of a tsunami disaster in the future. This policy was taken to protect the community from the risk of future tsunami disasters (Eviontri, 2020) and improve their lives for the better (Rita et al., 2020). The policy of relocating tsunami victims to places higher than their original settlements was also carried out in various places, such as Ohfunato, Japan. (Danar and Pushpalal, 2014) and Yoshihama (Maly and Ishikawa, 2014).

Location of Permanent Shelter Plan:

The location plan is the development and expansion of temporary shelter locations in 8 villages and 41 hamlets that already existed during the emergency response period, except for locations in South Sipora District, namely in two villages (Basua and Beriulou). These two villages must find a new location that is suitable for permanent housing because the location of the temporary shelter is in the hills, so it is difficult to reach, there is no available water source, and it is far from the location of the daily work of the affected community (interview with Head of Rehab Rekon BPBD West Sumatra and confirmed by the Head of BPBD Office Mentawai Regency). According to Eviontri (2020), the number of permanent residences built was 2,072 families. Each family head gets a land area of 30x35m2. This land is intended for a residential area of 30x15m2 and the rest for other uses by each family head. The land area given is different from the land area given for permanent housing in Yogyakarta for communities affected by the 2010 eruption of Mount Merapi, which is only 150 m2 for each family head (Maly et al., 2015).

The government provides the land in the 41 hamlets where the relocation is located. This is different from the case of relocation in other places, for example, relocation in the Philippines, where part of the land is provided by the private sector (NGO) independently (Iuchi and Maly, 2016). This policy shows the government's concern and responsibility for the condition of its citizens after being resettled and considering the future of the community affected by the disaster (Ahmed, 2011; Bawole, 2015).

The livelihoods of the resettled communities are farmers and cultivators of agricultural land or plantations around permanent residential locations except for 316 heads of families as fishermen (Elviontri, 2020). The shelter's location remains closer to their arable land than when the community still lived in the old location before the earthquake and tsunami, so this location is very favored by the beneficiaries, and they have lived in the location while living in temporary shelters. They have even formed a new community (interview with community leaders). Local communities and permanent residents, 2019). The height of the residential location varies with an average of 15-100 m above sea level (Rita et al., 2020). The locations are distributed in the affected

hamlets, with the land area adjusted to the number of fixed housing allocations. The grouping of dwellings is still based on the habits of the local community, who group and unite based on ethnicity (Eviontri, 2020; Iswanto and Hamdani, 2015).

The planned locations and the number of shelters built in each hamlet and village are shown in Table 3. In the North Pagai sub-district, 447 permanent dwellings were built spread over three villages and ten hamlets. The location is between 15 to 40 meters above sea level. In Sikakap District, there are 76 permanent residences in two hamlets in 1 village with locations located 10 to 25 meters above sea level. In South Pagai District, 936 houses were built in 18 hamlets in 2 villages at 15 to 150 meters above sea level. Meanwhile, in Sipora District, there are 613 permanent residences in 11 hamlets in 2 villages with locations at an altitude of 10 to 100 meters above sea level.

Table 3. Location and number of permanent housing built in the Mentawai Islands (Rita et al., 2020)

No.	Sub-Districts (Kecamatan)	Village (Desa)	Hamlets (Dusun)	Amount (unit)	Level (Height form sea level (m)	Type of building and area (m2)
1	Pagai Utara	Betumonga	Muntei	65	25-40	Semi-permanent, type 36 , area (6x6)
			Recently	23		
			Sabegunggung	53		
		Saumangany ak	Mapinang	59	15-30	Semi-permanent, type 36, area (6x6)
			Pasapuat	22		
			Mabulau	8		
			Buggei			
		Silabu	Tumalegogoa	46	15-25	Semi-permanent, type 36, area (6x6)
			North Syllabus	46	25-40	
			South Silabu	48		
			Manguiruk	77		
			Sub-total	447		
2	Sikakap	Taikako	Ruamonga	16	10-25	Semi-permanent, type 36, area (6x6)
			Bulakmonga	60		
			Sub-total	76		
3	Pagai Selatan	Bulasat	Linu	34	50-75	Semi-permanent, type 36, area (6x6)
			Mapinang	46		
			Maonai	35		
			Lakkau	19		
			Limosua	41	15-30	
			Surat Aban	110		
			Asahan	55		
			Bake	36	100-150	
			Lagigi	68		

			Maurau	21	
			Tapak	28	
			Bulasat	102	
			Kinumbuk	51	
			Sabbiret	62	
			Eruparaboat	77	
		Malakopak	Small	31	60-120
			Large Munte	41	
			Purourowat	79	
			Sub-total	936	
			Sao	93	
			Masokut Katiet	72	10-25
		Basua	Mongan Basua	61	
			Gobi	24	
			North Bosua	62	15-30
			South Bosua	51	
			Bare	58	
4	South Sipora		Mabukuk Monga	59	60-100
			Matalu	62	
		Beriulou	Masokut Ruwaleleu	38	
			Masokut		50-75
			Rogdang Oinan	33	
			Quantity	613	
		Total		2,072	

Semi-permanent, type 36, area (6x6)
Semi-permanent, type 36, area (6x6))

Permanent Shelter Plan:

The design of permanent residential buildings is planned by the Regional Disaster Management Agency of West Sumatra Province in collaboration with the Regional Disaster Management Agency of the Mentawai Islands Regency. The type of building is semi-permanent with a minimum size of type 36 (table 3). Type 36 is primary (core houses) which can be developed into a more significant type (see Figures 3, 4, 5, 6, 7). The development of a more significant type of core module is intended to provide opportunities for beneficiaries to adjust to the needs and readiness of their resources (Eviontri, 2020) and provide opportunities for communities to develop sustainably (Iuchi, 2014). Based on an interview with the Head of Rehab and Reconnaissance Division of BPBD West Sumatra Province, the basic design of type 36 is designed to match the availability of stimulus costs provided by the government for each permanent residence of Rp. 68,000,000 (±$ 5,000) and refers to the primary type of permanent housing in the reconstruction of the Aceh and Nias earthquakes (Steinberg, 2007) and the reconstruction design after the Yogyakarta volcanic eruption in 2010 (Maly et al., 2015). Development modules are prepared for four types: type 42, type 45, type 48, and type 50 (Figure 3-7). Beneficiaries can choose the type that suits their family's needs and resource readiness, but the cost of the stimulus provided by the government remains the same as the primary type 36. The development module allows beneficiaries to develop and complete the building as a whole without compromising the strength of the structure (Ahmed, 2015; Maly et al., 2015). This type is different from the type of relocation house

design in Yogyakarta (Maly et al., 2015), where there are 5 module design options with slightly different configurations. Five types were also designed for permanent residence in post-earthquake permanent housing in India (Barenstein et al., 2015). Meanwhile, permanent housing in Aceh and Nias is only designed for one type 36 (Steinberg, 2007). In contrast to permanent housing in Kepuharjo Village, Yogyakarta, the community demands a house pattern in the new settlement according to the house type module in the original area before relocation, although the core house type still refers to type 36 (Nainggolan, 2021).

Permanent residential buildings in the Mentawai Islands are designed, considering the building materials available in the relocation area. Materials for permanent housing are wood-dominated, with the specifications shown in table 3 (Rita et al., 2020). The foundation is made of pedestal concrete. Above the foundation is given a sloof of reinforced concrete measuring 20x20 cm with 12 mm diameter reinforcing steel. The bottom wall is 80 cm high brick, and the rest is made of wood groove boards. For the frame (columns and beams), 12x12 and 5x10 wood sizes are used, and 6x12 wood frames are used. The roof frame is made of wood, and the roof is made of zinc bjs 11. Wood ventilation is provided above the doors and windows, the floor of the house is tiled.

Type 36 **Front View Type 36** **Basic Perspective Type 36**

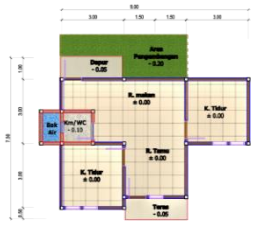
Figure 3. Base plan view and perspective type 36

Type 36-42 **Front View Type 36-42** **Perspective Type 36-42**

Figure 4. Plans and looks and perspective on the development of type 36 to type 42

Type 36-45 **Front View Type 36-45** **Perspective Type 36-45**

Figure 5. Plans and looks and perspective on the development of type 36 to type 45

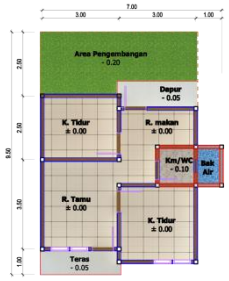


Type 36-48

Front View Type 36-48

Perspective Type 36-48

Figure 6. Plans and looks and perspective on the development of type 36 to type 48



Type 36-50

Front View Type 36-50

Perspective Type 36-50

Figure 7. Plans and looks and perspective on the development of type 36 to type 50.

Table 3. Specifications of the temporary shelter building (Rita et al., 2020)

Description of the building	Specifications	Description
The basic size of the	Type 36 building with a site area of 6x6 m2=36m2	The basic plan is prepared with an area of 36 m2 (type 36) and can be developed into type 42, 45, 48, and 50 according to the readiness of local community resources with a land area of ready to build for each family measuring 10x15 m2
Base foundation	made of concrete	
Holowbrick	Reinforced concrete measuring 20x20 cm	
Columns and beams	Wood measuring 12x12 cm and 5x10 cm	
Walls	80 cm high from foundation	
Walls wood	groove boards	
Roof frame	Timber	
Roof	Zinc zinkalum bjs 11	
Floor	40x40 cm	
Ventilation from the outside	Above the doors and windows consist of 4 holes Stimulant	
Cost per unit	Rp. 68,000,000.00 (±$ 5,000)	

Land Acquisition and Permanent Shelter Location Permits:

The relocation process by building permanent housing begins with preparing land and location permits for permanent housing. The location for permanent housing is an extension of temporary housing (Eviontri, 2020). A location permit is required because the residential plan area is a permanent production forest area by the Mentawai Islands Regency Spatial Plan 2000-2020 (Perda number 4 of 2003). A permanent production forest is a forest area that has the primary function of producing forest products and may not be used for other purposes

(Government Regulation number 10 of 2010). This permanent production forest reserved for permanent housing is managed by the private sector for a certain period (Eviontri, 2020). Therefore, this land cannot be immediately used. To be used as a location to build housing, it is necessary to change the status from production forest to production forest, which can be converted and converted into the forest for other use areas. Based on Government Regulation number 10 of 2010, convertible production forest is a forest area that is spatially reserved for use for development outside of forestry activities, while other forest use areas are forest areas that can be used for residential areas, public facilities, land. Community agriculture and plantations, land for industrial estates, and public infrastructure development. Procedurally, converting production forest to forest for other uses takes a long time, especially since the status of the production forest is stipulated in the RTRW based on the Mentawai District Regulation.

Considering that the affected communities have lived in temporary shelters for quite a long time and most of the temporary shelters have started to become unfit for habitation, the central government and local governments have agreed areas to change the status of permanent production forests by changing forest (Erviontri, 2020). The forest area required for relocation of permanent housing is 10,345 ha. Meanwhile, the forest area in the Mentawai Islands that can be exchanged consists of 5,965 ha in the form of forest area for other users and 4,072 ha with production forest status, so there is a shortage of 308 ha. This shortage is sought outside the administrative district of the Mentawai Islands Regency, so that land for housing remains sufficient. Finally, the shortage was facilitated by the Regent of Sijunjung at the request of the Governor of West Sumatra. This agreement is a joint effort of local governments to work together to solve disaster management problems. The agreement with the provincial government and district government is required for the central government's approval. The central government agreed to exchange forest areas based on the "bottom-up" so that the status of the forest that was reserved as a residential location would still change its status from production forest to forest for other uses. Thus, the residential development process can still be carried out at predetermined locations in each hamlet and village. This process shows mutual understanding and cooperation in implementing disaster management in West Sumatra. Building permanent housing begins with land clearing so that physical construction of permanent housing can begin in the second week of November 2013 and be completed by the end of 2016 (Eviontri, 2020; Rita et al., 2020). Figure 8 shows permanent housing in Bulasat, South Pagai District, which has been completed. This photo was produced by mentawaikita.com (2016).

Figure 8. Permanent shelters that have been built in Bulasat village, South Pagai sub-district (Mentawaikita.com, 2016)

Process of Permanent Shelter Development:

Learn from the experience of relocation and reconstruction of permanent shelters in Aceh and Nias carried out by third parties based on work contracts and the involvement of non-governmental organizations and the world's donor community under the command of the Rehabilitation and Reconstruction Agency/BRR (BRR-NAD-NIAS, 2009; Steinberg, 2007), so that the involvement of affected communities in the relocation process is relatively low (Steinberg, 2007). Community involvement in the reconstruction of permanent housing after the 2010 Yogyakarta earthquake was carried out in a Community-Based Housing Reconstruction and Relocation/REKOMPAK system (Maly et al., 2015; Uichi and Mutter, 2020). In the physical development process of permanent housing in the Mentawai Islands, the community is participatory by empowering the affected community (Eviontri, 2020). Reconstruction carried out in a participatory mode requires technical support and direction (Bawole, 2015; Ahmed, 2011)so that the beneficiaries of residential development will have good quality. This system begins forming community groups (POKMAS) in each affected village. This mode was chosen because it is very profitable and can empower the local community (Bawole, 2015; Carlo, 2017) and is by the Regulation of the Head of the National Disaster Management Agency number 17 of 2010. The participation of the local community is also triggered by the desire of the community to be directly involved in the development process. Direct community involvement is only during physical construction (Eviontri, 2020). In contrast to the relocation and reconstruction process in Yogyakarta, the community is involved from the beginning of planning and searching for relocation locations until the construction process is complete (Maly et al., 2015; Bawole, 2015).

The model of community empowerment in the physical development of housing is still carried out by forming community groups (POKMAS) who will live in permanent housing on the relocation land that has been determined. The community is grouped into 163 groups. Each group has a structure of Chairman, Secretary, Treasurer with 10-15 members of family heads. The selection of unique structures is carried out by deliberation and consensus by community groups independently. Each group is accompanied by a technical and non-technical facilitator (Eviontri, 2020). Technical facilitators assist and train community groups in the technical permanent housing development process, including construction management, so that the buildings built meet technical requirements. Technical facilitators were recruited from engineering graduates from various regions. Before being deployed to the location were given training and briefing on how to build earthquake-friendly houses by REKOMPAK Yogyakarta consultants (interview with Head of Rehab Rekon BPBD West Sumatra). The existence of technical facilitators is beneficial for community groups in the development process so that the community can learn from each other and at the same time help each other to accelerate the process of the physical construction of permanent housing.

Non-technical facilitators are tasked with managing financial administration in groups so that the financial accountability used does not violate the applicable financial rules in Indonesia. The existence of this facilitator is beneficial for community groups inadequately managing the physical development process and the financial and administrative disbursement process. This process shows social interaction and the spirit of cooperation from the communities involved, as also happened in REKOMPAK in Yogyakarta (Maly et al., 2015; Iuchi and Mutter, 2020).

According to the people directly involved in constructing permanent houses in the Mentawai Islands (interviews with several community leaders who took part in the construction process), they stated that they liked and liked the process carried out and thanked the government for involving them. Those directly involved can develop the shape and size of the shelter according to their abilities and needs and share experiences in a group. The sense of responsibility and ownership of the built buildings also became higher. In addition, the

motivation to immediately move from temporary housing is because they have lived in it for a long time, and most of the temporary residential buildings are damaged and unfit for habitation (Eviontri, 2020). The existence of a "Rob Parob" (please help) culture in the Mentawai community has triggered the affected communities to actively participate in cooperation and their habit of living in groups. Culture Rob Parob is the culture of the Mentawai people to help or provide assistance in various forms or problems faced by each citizen even though they have no kinship or lineage (Iswanto and Hamdani, 2015).

Conclusion:

The government's policy to relocate 2,702 households in the Mentawai Islands after the 2010 earthquake and tsunami in the Mentawai Islands Regency is an effort to reduce the vulnerability of affected communities to future tsunami disasters. The relocation locations are in 8 villages and 41 hamlets at an altitude of 10-100 meters above sea level and close to their daily work as farmers or farm laborers. The land permit process for relocation is prolonged and complicated because the land is a permanent production forest managed by the private sector with a permit for a specific time. Production forest must still be converted into production forest, which can be converted first, then converted into the forest for other use areas. The process of procedural change takes a long time while the need to build shelter remains very urgent because the affected people have lived in temporary shelters for a long time, and some of these temporary shelters are no longer suitable for habitation. Based on the situation and condition of the affected community, the local government and the central government agreed to change the status of production forest to other forest uses through the exchange of forest areas. Permanent production forests needed for residential areas are still exchanged for other forest areas to be used as production forests. The forest area available in the Mentawai Islands Regency is 10,037 ha, while the land requirement for permanent housing is 10,345 ha, so there is a shortage of 308 ha. This deficiency was agreed to be facilitated by Sijunjung Regency. The results of the agreement sought approval from the central government. Based on the central government's approval, the construction of permanent housing began at the end of 2013 and can be completed by the end of 2016. The land area given to the beneficiaries is 30x35m2 with an area of 30x15m2 for housing, and the rest can be used for other purposes by the beneficiaries. The type of building for permanent residence is semi-permanent, with the primary building material of wood. The size of the building plan is prepared with an introductory module type 36, which can be expanded to a larger module in the form of types 42, 45, 48, and 50 according to the abilities and needs of the beneficiary household heads. The residential development pattern continues to be used as a community empowerment model by forming community groups. Technical and non-technical facilitators guide community groups. This pattern shows the existence of cooperation and helping fellow affected communities. Beneficiaries and managers like this method because the physical development process is smooth and administratively accountable. This pattern can be developed for the future and elsewhere in a disaster that requires the relocation of new settlements for disaster-affected communities.

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