

## Flood Disaster Adaptation In Mentawai District Based On Local Wisdom: Comparative Study Of Disaster-Friendly Houses (Uma)

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### Abstract

In the last decade, the intensity and quality of disaster threats in the Islands Mentawai the more tall. Experience has given birth to local wisdom in adapting to natural disasters, especially flood problems. One of the local wisdom possessed by the Mentawai people to adapt to floods is disaster-friendly houses ( *Uma* ). So this article was constructed to examine *Uma's axiology* in dealing with floods. The research method used is a qualitative approach, where data collection techniques use interviews and observation. In-depth interviews were conducted with two different community groups, namely the elite group and the lay community group consisting of 3 elite groups; traditional leaders, religious leaders, and community leaders as well as 20 general public groups. Data validation was carried out using triangulation techniques and analyzed through a series of data reduction, data presentation, and concluding/verification. Research findings show that *Uma* has strong adaptive and mitigating powers in dealing with flood disasters. *Uma* can be compared to the construction of developed countries such as Japan, the Netherlands, and England in adapting to flood risks. Increasingly complex climatic conditions, together with the consequences of inappropriate *tourism expansion and weak land use management, have led to an increase in the frequency and severity of flooding in the Mentawais – saltwater intrusion, temperature changes, weather changes, and landslides*. The Mentawai region is increasingly vulnerable to the risk of saltwater intrusion, which affects the ability to supply clean water and develop regional infrastructure. Rainfall combined with higher tides has caused an increase in the extent of flooding, especially in the lowland areas of Mentawai Regency

**Keywords** : *Flood Disaster Adaptation ; Uma ; Local wisdom ; Mentawai*

### INTRODUCTION

Mentawai is the Wrong Regency with a potency of disaster natural Which complex, Good disasters natural like Earthquakes, landslides, tsunamis, and even floods often occur on the islands of Mentawai Regency. This district is located in West Sumatra Province The capital of Tua Pejat Regency is on Sipora Island. This district consists of 4 large islands plus small islands (94). These four big islands namely Siberut Island, Sipora Island, North Pagai Island, and South Pagai Island. Topographically, the geographical situation of the Mentawai Islands Regency varies between mainland, river, And hilly Where the average height area all over the sub-district capital from the surface sea (DPL) is 2 meters.

Administratively, the Mentawai Islands Regency consists of 10 sub-districts, 43 villages, and 266 hamlets. The ten sub-districts are shown in Table 1.

Regency Island Mentawai is categorized as located in a location vulnerable to natural disasters, the fact is that it is known that natural disaster phenomena often occur with various types of disasters from year to year. In line with the opinion above, strengthened with guided on base Data Information Disaster Indonesia ( DIBI) summarized that several phenomena had occurred disasters in the Mentawai Islands with various types of disasters. The types of natural disasters that occurred are shown in Table 2.

Based on the table in above, data recorded in the database Indonesian Disaster Information from year to year, throughout 2022 to five In recent years, the

Mentawai Islands district has been hit by various disasters nature, such as floods, landslides, earthquakes, tornadoes, and waves plug/abrasion. One of the reasons for this disaster was the Regency Island Mentawai in a way geographical Also 90% area waters.

In the last decade, the intensity and quality of disaster threats in the islands of Mentawai the more taller. An experience like This gives birth to local wisdom in effort mitigation and adaptation against natural disasters. Local wisdom is one form of mitigation and adaptation that exists in the Indonesian public. Lots of researchers say that wisdom local is the effort for disaster mitigation. Local wisdom in disaster mitigation can be found in forms like text, architecture building, object reserve culture, and in intangible form such as advice conveyed verbally and passed down from generation to generation in the form of songs and hymns (Resha & Ernawati, 2019). Be marked with the discovery of cultural traditions that are still carried out and believed in to maintain a balance of life with the environment in the Mentawai Islands. Furthermore, the results of the investigation and The researcher's initial observations show that there is still a lot of local wisdom to be found related to mitigation and adaptation of disasters.

As for several findings wisdom local as mitigation culture is still being done through ritual ceremonies For spared from disaster. Whereas mitigation structurally like society still uses a philosophical approach to build a house called *uma*, the building is designed in such a way To stand against disaster, find its studio at each rural place, And Also take cover when happen disaster, This is Wrong One mitigation for disasters. In addition to cultural and structural mitigation, communities on Island Mentawai Also adapt to adaptation danger disaster natural. The adaptations are such as active and passive adaptation, social adaptation, and adaptation culture.

In the study, found in various forms of wisdom locally related with mitigation and adaptation to natural disasters in more depth. Discussion includes wisdom local Which becomes forms mitigation cultural And structural as well as wisdom local Which becomes adaptation active & and passive, adaptation social, And adaptation culture based on function, condition, And sustainability wisdom local At this time, the reasons for this local wisdom are starting to be abandoned, potential development of local wisdom to reduce future disaster risks and its use for tourism aspects that can support the economy public.

Table 1. Wide\_region each subdistrict in Island Mentawai

No	Region Subdistrict	Wide Area (Km2)		
		2018	2019	2020
1	Pagai South	901.08	851.28	851.28
2	Attitude	278.45	312.60	312.60
3	Pagai North	342.02	571.25	571.25
4	Sipora South	268.47	348.33	348.33
5	Sipora North	383.08	272.40	272.40
6	Siberut South	508.33	328.00	328.00
7	Siberut West Power	649.08	1013.83	1013.83
8	Siberut Middle	739.87	589.75	589.75
9	North Siberut	816.11	782.68	782.68
10	Siberut West	1124.86	1163.64	1163.64
11	Island Mentawai	6011.35	6033.76	6033.76

*Note:*  
The area area as of 2018 is sourced from the Mentawai Islands Regional Regulation No. 53 of 2017. Area area since 2019 comes from mapping And update Statistical Work Area (CPM)  
Source: <https://mentawaikab.bps.go.id/indicator/153/30/1/lebar-region.html>

Table 2. Incident Disaster In Island Mentawai

No	KIB (Identity Code Disaster)	Region	Incident
1	1301108202103051	Regency. Island Mentawai	Earthquake
2	1301101202010221	Regency. Island Mentawai	Flood
3	1301103202010061	Regency. Island Mentawai	Flood And Land Landslide
4	1301101202009301	Regency. Mentawai Islands	Flood
5	1301101202007281	Regency. Island Mentawai	Flood
6	1301104202005091	Regency. Island Mentawai	Wave Plug/Abrasion
7	1301105202005081	Regency. Island Mentawai	Nipples Pickaxe
8	1301101202005021	Regency. Island Mentawai	Flood
9	1301101202001291	Regency. Island Mentawai	Flood
10	1301102202001221	Regency. Island Mentawai	Landslide
11	1301104201908081	Regency. Island Mentawai	Wave Plug/Abrasion
12	1301102201903291	Regency. Island Mentawai	Landslide
13	1301108201902021	Regency. Island Mentawai	Earthquake
14	1301101201811021	Regency. Island Mentawai	Flood
15	1301101201810111	Regency. Island Mentawai	Flood
16	1301101201809071	Regency. Island Mentawai	Flood
17	1301101201808081	Regency. Mentawai Islands	Flood
18	1301108201704211	Regency. Island Mentawai	Earthquake
19	1301101201412231	Regency. Island Mentawai	Flood
20	1301102201411271	Regency. Island Mentawai	Landslide
21	1301101201411261	Regency. Island Mentawai	Flood
22	1301101201304071	Regency. Island Mentawai	Flood
23	1301104201211131	Regency. Island Mentawai	Nipples Pickaxe
24	1301105201109091	Regency. Island Mentawai	Wave Plug/Abrasion
25	1301109201010251	Regency. Island Mentawai	Tsunamis
26	1301108200909301	Regency. Island Mentawai	Earthquake
27	1301108200908161	Regency. Island Mentawai	Earthquake
28	1301108200802251	Regency. Island Mentawai	Earthquake
29	1301108200709121	Regency. Island Mentawai	Earthquake
30	1301104200507271	Regency. Island Mentawai	Wave Plug/Abrasion
31	1301102200011251	Regency. Island Mentawai	Landslide
32	1301101194306061	Regency. Island Mentawai	Flood

Furthermore, the natural disasters often faced by the Mentawai people are floods, as can be seen from Table 2 above. With the rapid population growth rate, infrastructure has not been able to meet the overall planned increase, spatial planning is still inadequate, and some residents' awareness of environmental protection is still weak. Mentawai Regency is increasingly facing flooding problems. The main reasons are geographical conditions and climate change conditions which cause salt water to infiltrate deep into the ground and local climate changes cause high tide levels.

Understanding and assessing the impact of flooding on residents in Mentawai Regency, from which to develop planning and architectural solutions to overcome

flooding is necessary to protect the lives of residents from flooding, improve the quality of life of the community, promote the potential value available in the region, and towards development sustainable in the future. However, the *local wisdom approach* from residents in dealing with flood disasters is the construction of disaster-friendly houses ( *Uma* ). So there is an important question regarding this condition: how can *Uma* protect the Mentawai people from flood disasters?

## METHOD

Following up on academic questions from this article, researchers conducted field research with a qualitative approach, where data collection techniques used in-depth interviews and observation. In-depth

interviews were conducted with two different groups of people, namely elite groups and ordinary people. The elite consists of traditional leaders, religious leaders, and community leaders who understand the historical philosophy of the formation of *Uma*. Three elite groups were interviewed, and from each elite subgroup, three people were taken: traditional, religious, and community leaders. Meanwhile, the general public group consists of 20 people with different backgrounds and socio-economic status. In the interview process, the researcher used an interview guide which contained several important questions to find answers to the research questions.

Observations were carried out on local social institutions such as lapau, surau and local public baths as well as through involvement in various activities related to emergency response and rehabilitation measures. Data validation was carried out using 2 techniques, namely source triangulation and triangulation techniques. Meanwhile, data analysis uses the Miles and Huberman (1994) model which consists of data reduction, data presentation, and drawing conclusions/verification.

## RESULTS AND DISCUSSION

### Results

The Mentawai tribal community has its own approach to understanding and acting on natural resource management. Mentawai Islands Regency, as an area prone to disasters, the Mentawai tribal community has various kinds of local wisdom as a result of the community's introduction to the surrounding environment. Local community knowledge about how to manage the natural environment can also be used to improve community mitigation and disaster adaptation. Munandar et al., (2022) There is several local wisdoms in the form of disaster management owned by the Mentawai people, namely "Arat Sabulungan" as a belief of the Mentawai people which is used as a guide for their

lives, both with nature, social and culture; "Uma" as a place to live is a building that is strong and resistant to earthquakes; and the folklore "Sitakkigagailau and Pangetasabbau" which provides a view of life for the community, both natural, social and cultural views.

The earthquake and tsunami disaster that occurred in the Mentawai Islands district made the Mentawai people implement disaster mitigation by making houses on stilts as their residences, known as umma. Ramadhan and Taqyuddin (2021) stated that *Uma*, a place where the Mentawai tribe lives, has a place and a road that is used for evacuation in the event of a natural disaster. The existence of places and roads for evacuation indicates that the Mentawai people have adapted to natural disasters. The house in Mentawai was built with the help of the family. The materials used to make the house were taken from the forest and have a building structure that is strong and flexible enough to withstand earthquake shocks (Munandar et al., 2022).

In principle, the house (*Uma*) for the Mentawai tribe is almost the same as the design of the Rumah Gadang in the Minang community. Ramadhan & Taqyuddin (2021) The design of the gadang house is supported by long and sturdy poles that resemble a ship with a height of 3 meters from the ground used as a foundation, this proves that the house is very strong. The house was created in a philosophical way, like the strength of a ship that sails amidst the shaking waves but remains sturdy.

*Uma* is basically the same as a stilt house inherited from traditional architects which in fact is a characteristic of Indonesian architecture. The stilt house model refers to traditional wisdom by seeking harmony and reflecting the values of friendship and aligning oneself with the universe. The principles of stilt houses that are healthy, earthquake resistant and minimize the risk of flooding should be maintained in villages and cities. Especially in water catchment areas, coastal areas and mountainous areas whose sustainability must be maintained (Soeroto, 2003).



Figure 1. Mentawai disaster friendly house (*Uma*)

Something is interesting about *Uma*, namely that there is ontological continuity with various local wisdoms of developed countries in dealing with and mitigating disasters. Japan has something called the Mizuya high house which is used to reduce the impact of flooding as a way for Japanese people in the Kanto region to adapt to flooding. The house has 2 rooms, 2 storerooms and 1 toilet. Some families also have boats to evacuate in case of emergency. Usually, part of the main house is elevated and can be turned into a shelter. The advantage is that the house is built on high ground, and used in case of flooding, to store and protect property. In the first stage, the foundation height was 2m, after high floods, the house was raised more than 1.3m above the old 2m foundation, the house has been renovated to last a long time when natural disasters occur. The disadvantage is that construction is quite expensive (Chung, DT., & Dan, LH., 2018).

Furthermore, in the Netherlands, many house models are designed like

boats, which can float on water in all weather conditions. Dura Vermeer Design (Netherlands) offers a “floating village” project for around 12,000 people near Schiphol Airport, not far from Amsterdam. This design consists of floating houses that form a cluster of houses with the following characteristics: The structure is made of hollow concrete is watertight and can float with the house. An immersion concrete tunnel remains below the water surface, in which the booster piston is placed. When the water rises, the house can float in high water. Several other types of houses, such as terraced houses, and high-rise houses are built on the ground, as well as the surrounding waterways and canals, which form a network of transportation systems throughout the village. Transportation is by boat. A typical example is the ancient ecological village in the Dutch province of Overijssel, 148km from Amsterdam, this village was formed in 1230 and exists to this day. The houses here look very ecological (Chung, DT., & Dan, LH., 2018).



Figure 2. Giethoorn floating village house (Overijssel province, Netherlands)

Lastly, the British Floating House built by construction company Aquabase in Leeds. The house is built on a floating platform which allows the house to float freely, and is even able to navigate like a houseboat. This house was designed with the hope that it would last more than 100 years. The most basic advantage of floating homes is flexibility, which can cope with rising water, residents can easily move their

homes from dangerous areas to safe areas during the flood season. However, it also has weaknesses, such as using floats means the house will not be connected to the electricity network, and the ability to manage the community is not good. However, this can now be overcome with solar or wind power supply systems, with mobile communication technology, advanced water tanks.

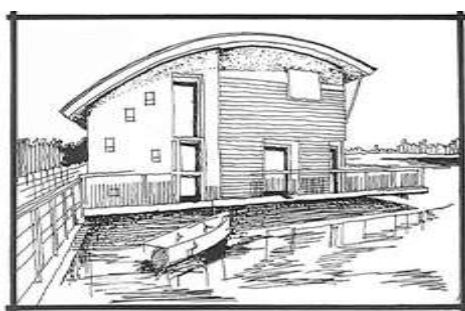


Figure 3 . British floating house

*Uma*, which in fact was designed by the Mentawai people, can be said to be relatively ordinary, apparently has adaptive and mitigative powers that can be compared with the construction of developed countries in adapting and mitigating flood risks. Increasingly complex climatic conditions, together with the consequences of inappropriate *tourism expansion and weak land use management, have led to an increase in the frequency and severity of flooding, especially in the Mentawais – flooding, salt water intrusion, temperature changes, weather changes and landslides*. The Mentawai region is increasingly vulnerable to the risk of salt water intrusion, which affects the ability to supply clean water and develop regional infrastructure. Rainfall combined with higher tides has caused an increase in the extent of flooding, especially in the lowland areas of Mentawai Regency.

### CONCLUSIONS AND SUGGESTIONS

*Uma* has strong adaptive and mitigative powers in dealing with flood disasters. In fact, *Uma* can be compared with the construction of flood-adapted houses from various developed countries

such as the Japanese Mizuya House, the Dutch Floating Village House and the British Floating House in adapting to flood risks. Therefore, to overcome the consequences of further flooding, district development planning solutions and residential architectural designs are still needed to be more ecological with the current climate situation, creating a living environment with high adaptability and sustainability in the future..

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