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LANDSCAPE STRATEGY USING NORM STRUCTURE TO PREVENT AND MITIGATE TSUNAMI DISASTER CASE STUDY IN ACEH, INDONESIA

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Abstract

Once phenomena happened in Simeulue Island where Indian tsunami occurred on December 2004 called *Smong* that saved villagers life. They have this knowledge because their ancestors inherited for almost a century. They remember it every day as part of their life as norm. This research purposed to use its norm structure as concept of designing landscape as prevention and mitigation planning to inform and guide people escape if tsunami appears. Landscape planning as one solution to let people learn from what is inherited by community before. It will keep both nature balance and people lives that protect and support quality of their lives for long term planning. Its concept will be differently implied according to character of the area. Comparing land types to find fits landscape strategy to improve not only environment but also quality of life then sharing the norm in community will be new concept in designing landscape plan as one of option to sustain life forwards survived tsunami. This is one way to inform and guide people to be able saving their lives if tsunami struck over again.

Keywords: Prevention and mitigation Tsunami disaster, Tsunami, Landscape, Norm.

1. Introduction

Disaster is part of living process that happens naturally so as can keep its balance. Even though it destroys settlements and hurts human being as its consequence, yet it still can be prevented and mitigated by learning to previous experience of people in the past. One of the scariest disasters is Tsunami which the waves can swept away all plants, buildings and people in flash. People can understand the nature signs about any unusual indication such as huge earthquake, low tide and animal's movement which describes Tsunami disaster then they will try to escape to correct direction not only immediately running but also run to higher land instead to run in the opposite side of the waves. It will be too late if they rely on running fast while the waves straight behind them because the speed of Tsunami is incredibly fastest to ordinary waves.

In term of short time and emergency, sharing and distributing information becomes essential in community system which everyone agreeable of condition so that the action they will do is for their own merit. Emotional distraction like panic, selfish and rushing are familiar arise among the people who want to save their lives. Prevention and mitigation tsunami disaster could be learned from previous event when the same area was stroke by the same disaster. The knowledge that inherited by ancient people could bring the effectiveness in reduction damaged caused by disaster. It is proven by traditional knowledge in Simeulue Island. Traditional knowledge as though *Smong* in Simeulue is part of culture in Aceh, Indonesia. *Smong* is ilk of traditional song that the message sings by people in Simeulue guided people for living safe when tsunami happened on 2004.

The aim of this research is to discern how to guide people to escape and save their lives when tsunami happens that they share information as norm to choose venue for staying surrounding their neighborhood as if it possible or find higher land such as hills or mountain that can resist waves of tsunami. Because vary persons stay inside neighbourhood as though their identity, vitality and age. Do they have knowledge about tsunami disaster? Not every society has inherited knowledge as like Simeulue people. This phenomenon directs me to landscape as option to lead citizen in general circumstances that diverse to decide correct action to do further.

2. Literature Review

This research refers to tsunami as natural disaster and norm as media to deliver information inside society. Disaster resilience is one step to mitigate catastrophe's impact both mentally and physically of human being. Recovery will be the most important phase after disaster destroys an area no matter scale of failure posed still normal perception will be not similar as it was. By having a natural hazards mitigation plan in place, the community has a framework to guide the recovery effort and to make informed decisions in an environment of chaos, uncertainty, and expediency. The plan can help keep decision makers focused on the ultimate goal of creating a more sustainable, resilient community and help establish priorities for action (Jacquelyn Monday, Clancy Philipsborn, Sarah Michaels, Ann-Margaret Esnard, Charles Eadie, Brenda Phillips, Rod E. Emmer, David Salvesen, 2005).

2.1 *Tsunami*

Tsunami have a wavelength, a period, and a deep-water or open-ocean height. They can undergo shoaling, refraction and diffraction. Most tsunami generated by large earthquakes travel in wave trains containing several large waves that in deep water are less than 0.4m in height. Tsunami wave characteristics are highly variable. In some cases, the waves in a tsunami wave train consist of an initial peak that then tapers off in height exponentially over four to six hours. In other cases, the tsunami wave train consists of a maximum wave peak well back in the wave sequence. The time it takes for a pair of wave crests to pass by point is termed the wave period. This is crucial parameter in defining the nature of any wave. Tsunami typically have periods of 100s-2,000 s (1.6min-32 min) referred to as the tsunami window. Waves with this period travel at speeds of 600 kmh⁻¹-900 kmh⁻¹ (166ms⁻¹-250ms⁻¹) in the deepest part of the ocean, 100kmh⁻¹-300kmh⁻¹ (28ms⁻¹-83ms⁻¹) across the continental shelf, and 36kmh⁻¹ (10ms⁻¹) at shore. Paragraphs immediately following their headings are to be justified on both sides (Bryant, 2008).

2.2 *Definition of Norm*

A norm can be defined as "a standard of appropriate behavior for actors with a given identity (Martha Finnemore, Katheryn Sikkink, 1998). Norms are distinguished from ideas or beliefs, which do not have to be directly linked to actor behavior or shared at a collective level. In addition, ideas and beliefs do not need to be attached to value judgments (Yoichiro Sato, Keiko Hirata, 2008). In contrast, norms are accompanied by value judgments and are often seen as reflecting "good" or "bad" behavior (though, as mentioned above, most norms studied by IR scholars tend to be those with positive associations) (Paul Kower, Jeffrey Legro, 2002). A norm should also be distinguished from an institution, which, in one meaning of the term, can be described as a collection of norms. Furthermore, a norm is distinct from behavior, so if a researcher wants to study the effects of norms on state behavior, it is critical to operationalize norms in a way that separates them from the behaviors they might affect (Martha Finnemore, Katheryn Sikkink, 1998). Norms have an explicit place in psychological measurement, notably in psychometrics. A norm in this sense refers to what is typical or average with a view to the interpretation of scores, i.e. in norm-referenced testing (Knowles, 2003).

Allan gibbard says in his book wise choice, apt feeling about rationality of belief, action and feeling "what it makes sense" to do or to believe, or when we speak of "the wise choice" in situation. It is the one we use when we ask what we "ought" to do, or search for the "best thing to do", in a way that does not already presuppose we are talking morality. With feelings, it is the nation we use when we talk of anger, say, as warranted, or pity as apt or misdirected. There does seem to be a common thought involved in all these turns of phrase, even if shades of meaning differ; one test is to apply one phrase to an action or feeling while denying another is to invite puzzlement" (Gibbard, 2002).

2.3 *Landscape Design*

Landscape, as defined in the European Landscape Convention, can be understood as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (Council of Europe, 2000). This careful wording embraces a number of ideas: a landscape is a relatively bounded area or unit; its recognition depends on human perception, which often is spontaneous and intuitive in its identification with a coherent tract of land; and it results from a long legacy of actions and interactions. However, it contains one rather debatable yet intentional element – landscapes may derive from a combination of natural and human factors, but equally they can be purely socially or purely naturally produced, and in the latter case there need be no explicit cultural component (Selman, 2006). However, such landscape knowledge is not the same everywhere or over time: each culture, region or community has a distinctive vocabulary of landscape elements and patterns, some of which are widely shared, while others, as we can find to our surprise when we travel, are very specific. Hence although we all possess tacit landscape knowledge, what we know depends upon where and how we live (Sheila Harvey, Ken Fieldhouse, John Hopkins, 2005).

3. Methodology

3.1 Web survey

We conducted a web survey through online questionnaire to people who were in Banda Aceh when Indian tsunami stroke at the end of December 2004. They are 52 respondents from Banda Aceh answered thirty question that categorized to five sections are identity, vitality, experience, action and expectation of recovery phase. Those questions asking what people reaction and how they shared the information. As mentioned before about theory of Allan Gibbard is feeling of people that affect their actions especially in case of escape from tsunami disaster. It shows belief; action and feeling which these elements are basic rules of norm that naturally they share each other.

Table 1 result of web survey related to norm affects people's decision

Norm	Questions	Options	Result
Belief	Where will be the fastest venue to go?	Mosque	16
		Hills	14
		Escape Building	11
		Public service	3
		others	8
Action	What will be the easiest signs to recognize of tsunami warning?	Siren	24
		Announcement	7
		light	4
		Siren and Announcement	15
		others	2
Feeling	Who will be priority to rescue?	Baby	46
		Disable (adult)	3
		Elderly	3

According to result above, obviously mosque is the place that they thought as the safest place to go if tsunami happens. Siren is the easiest media to recognize of warning alarm. Furthermore, 88.5% respondents choose baby as their priority to be saved with them.

3.2 Category zone levels

We developed four category of zones as alternatives for landscape strategy refers to local government plan of Aceh Government and potential of hazard and risk tsunami disaster that designed by Tsunami Disaster Mitigation Research Center (TDMRC).

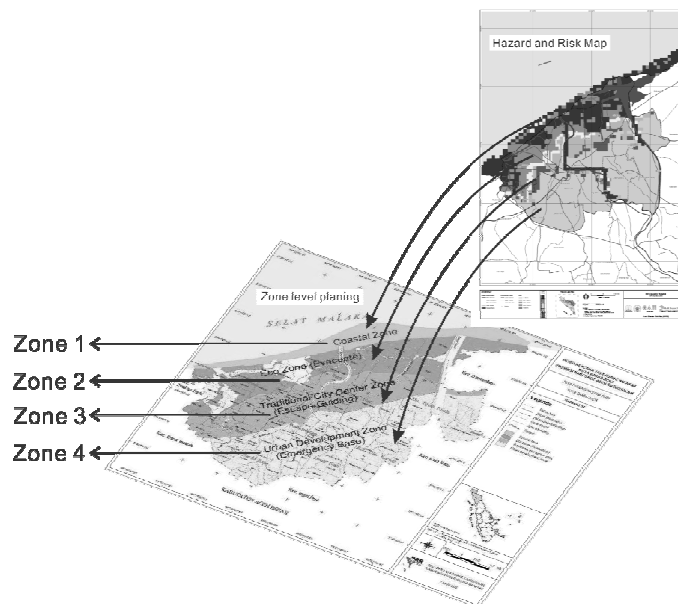


Figure 1 Four category of zones based on hazard and risk map and local Aceh government planning
 Source: Bureau of Development Administration, Secretariat of Aceh, Aceh Government (2009)
 Tsunami Disaster Mitigation Research Center of Syiah Kuala University (2011)

4. Result and Analysis

4.1 Norm Analysis

According theory explained by Gibbard about feeling that affecting people in making decision, we purpose information strategy as following.

Table 2 Reflection of norm that may affect people's decisions

	NORM AFFECTION	ACTION MAY OCCURRED	APPROPRIATE PROPOSAL
People	Belief (religious and spiritual calls)	They will return to religious facilities and do any action based on knowledge which they get spiritually.	We may deliver the information through religious facilities.
	Action (following neighborhood calls)	- They always see what other people do. - They trust the community surrounding them.	We may share the information through education, practice and reading materials so people will do commonly.
	Feelings (personal and private calls)	They do as what their hearts said.	We may share experience, memory and knowledge as information for them so they can control their emotions and be wise to make decision.

Delivering information needs media which fit able for people based on their criteria. These media can invite recognition from people in minimum effort as efficiency of norm that has been bond citizen already. There are three kinds of media support information to be accepted by people.

Table 3 Type of media support information to be accepted by the people

MEDIA	CHARACTERS	FACILITIES
Audio	It can produce loud voice and clear It can work without signal and electricity It can be repeated It may set automatically	- Microphone - Stereo set - Alarm - Serine - A pop
Visual	It is universal design so everyone can easily to understand It is attractive and catching eyes It can work without signal and electricity It can be repeated and durable It may set automatically and visible	- Lights - Signs and directions - Maps - Escaping traces - Guiding paths
Sense of balance (Spatial)	Topography design which guide people to higher land Spatial contours that easily to be claimed It is visible Its proportions are compatible for loading many people to run and escape	- Stairs - Leading paths and safe - Not exhaustive design for long distance - Provided break points with information of zones level of safety

Social identity affects how information can be delivered appropriate correctly. Since their backgrounds are different both language and lifestyle make native convoluted giving direction to survive from tsunami to migrant. In consequence, we suggested two ways of communication as norm that they can learn regularly in neighborhood and spatial experience surrounding.

Table 4 The communication issues inside community between native and migrant

IDENTITY	DEFINITION	CHARACTERS	ISSUES
Native	One of the original inhabitants or lifelong residents of a place	- They stay in one place, area or region which is hereditary for long time - They may have traditional language and similar culture to be shared - They have been agreed on common beliefs, values, attitudes and behaviour that reduced in-groups threats act for the common good	- They inherited traditional knowledge or historical events either disaster or histories from their ancestors - They create their own language as traditional language and keep their culture - They make their rules as social norm for their groups in community - They know and understand their motherland.

Migrant	One that moves from one region to another by chance, new job or plan	<ul style="list-style-type: none"> - They move from one place to another for awhile - They may have known only general information about new area where they stay - They cannot understand the culture and traditional language of their current area without learning it before 	<ul style="list-style-type: none"> - They do not understand any traditional knowledge and language, and their new circumstances. - They use general language to communicate with natives - They have their own culture from where they are belong - They follow the rules and norms in community
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4.2 Landscape analysis

We arranged category of zones from the first direct impact area of tsunami and analyzed by altitude assumptions as condition for suggesting evacuation spatial. Both result and analysis are following.

Table 5 Evacuation spatial based on altitude assumptions

ZONE LEVEL	CATEGORY	DISTANCE FROM SHORELINE	LANDSCAPE PATTERN	ANALYSIS	PROPOSAL
Coastal zone	Zone 1 (Coastal area)	1-2 km	Flat	<ul style="list-style-type: none"> - Short time to escape that less than 5 minutes - Away from higher land - Wave of tsunami comes faster because the land is plain 	Proposal: Escaping field with vehicle Reason: Crowded can be seen from long distance and used vehicle can help people escape faster
			Contour	<ul style="list-style-type: none"> - Short time to escape that less than 5 minutes - Close to hills and mountain - Wave of tsunami can be hold naturally by hills and mountains 	Proposal: Escaping hills with shelter Reason: Climbing hills saved time for people to escape rather than go to main land and traffic jam can be avoided
Eco Zone	Zone 2 (Rural area)	2-3 km	Flat and contour	<ul style="list-style-type: none"> - Time to escape about 5-15 minutes - Traffic lines will be problem while people try to move backward to the city - Wave of tsunami slower reach this zone because it has longer distance from shoreline 	Proposal: Escape building surrounding by mangrove forest for flat area (swamp) and embankment for contour area Reason: Escape building with appropriate structure can load people to stay that safer than mobile where tsunami can catch them in any time
Traditional city center zone	Zone 3 (City core)	4 km	Flat and contour	<ul style="list-style-type: none"> - Time to escape about 15-25 minutes - Traffic and building density detain people move by vehicles even running may harm them because impact of earthquake is unpredictable 	Proposal: High rise buildings that can functioned as escaping building Reason: Height of building needs to protect people from flood caused by tsunami
Urban development zone	Zone 4 (City)	> 4 km	Flat and contour	<ul style="list-style-type: none"> - Time to escape more than 25 minutes - Complicated traffic and building density confusing people to go generating turbulence not only by people but also by vehicles and wreckage of previous earthquake 	Proposal: Buildings that can functioned as escaping building Reason: People needs shelter and safe place to stay from flood and silt from damaged area before

We found as result is the most important is warning should be deliver people by audio in any language. On the other hand, if path and stairs should be provided than light and signs should be attracted people in case at night and electric shutting down.

5. Conclusion

We concluded that in case of Banda Aceh post Indian tsunami, they have experiences to find higher land or escape building to go if tsunami comes back yet foreigners or migrants may do not have any of this knowledge. Here is role of landscape planning as tools to deliver this norm which created according to experienced that natives felt seven years ago. By having these two connections both social and spatial agreeable scene for escaping in emergency purposed to minimize time that they need to save lives. As of mitigate tsunami and reduce victims who may stay in coastal area no matter natives or migrants. On the other hand, practicing and distributing information of escaping from tsunami should be share in traditional, national and international language.

Landscape planning is suggestion for recovery phase which will take time and process to be realized. This is not emergency moment but short and long term planning to bind people in the community no matter if they are natives or immigrants. Both of those groups can understand and have similar perceptions for saving their lives. The designs work as prevention and also mitigation both for people and environment.

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