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Partnership in Building Community Resilience on Disaster in the Region of Coral Triangle, Indonesian Case

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Abstract

Indonesia is located in the area what so called of ring of fires therefore the probability of coastal vulnerability is very high. By its location is facing possible disasters namely earth quake and tsunami, flood, hurricane and storm, climate change and sea level rise (SLR), and others. Since the coastal areas are mostly inhabited (145 million) and having the situation that coastal areas prone to the potential disasters therefore it is necessary to increase the capacity of the people who are living in the coastal areas. Capacity building to the people or to the community will reflect the ability of the people coping coastal hazards and disasters. This paper will explain how to build a Community Resilience[1] in order to increase the ability to reduce risks or probability of risks on possible potential disasters.

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Keywords: Tsunami, coastal vulnerability, climate change, community resilience

1. Introduction

The Coral Triangle (CT)[2] is located along the equator at the confluence of the Western Pasific Ocean and Indian Ocean. It covers part of the EEZ (exclusive economic zone) of six countries namely: Indonesia, Malaysia, Papua New

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Guinea, the Philippines, the Solomon Islands, Timor Leste and (Fig. 1. IRS CTI[3]). In 2007, the Coral Triangle States came together to established CTI CFF (Coral Triangle Initiative on Coral Reefs, Fisheries and Food Securities). Right now the CTI CFF has 6 member states (CT 6 States) namely Indonesia, Malaysia, Papua New Guinea, the Philippines, the Solomon Islands, and Timor Leste. Lately Brunei Darussalam is an Observer State and it will become a member of CTI CFF Organization very soon. Coral Triangle possess 75 percent of all known coral species. This area is considered as the global epicenter of marine life abundance and diversity. The CT serves as the spawning and juvenile growth areas for the world's largest tuna fishery[4].

The Coral Triangle area exposes to Vulnerability due to disasters such as: Climate Change, Sea Level Rise, Storm Surge, Sea Surface Temperature Rise, and Ocean Acidification, etc.

Among those CT 6 States, Indonesia is the largest in term of area and also in term of its sea water. Indonesia is also a complex State which has a large number of Population and has so many different tribe, and languages.

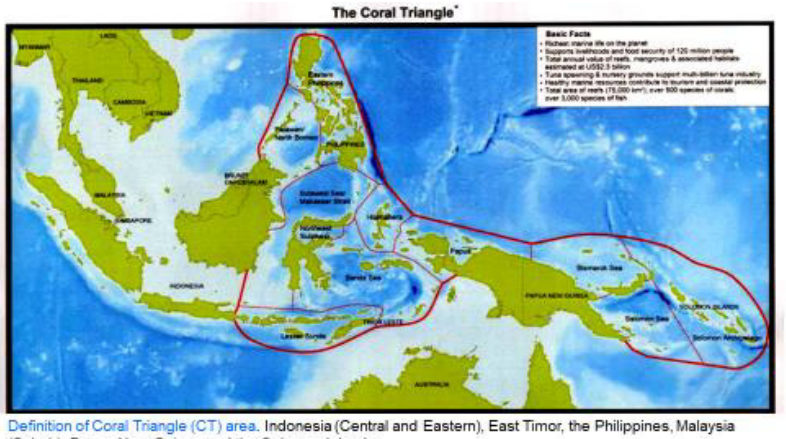

Fig. 1. Coral Triangle the epicenter of marine life abundance and diversity[2,3]

In conjunction with ISOCEEN 2014, this paper discuss how to build Community Resilience of disasters in the Coral Triangle area and with emphasizing in the case of Indonesia.

Indonesia, its location is between 95 – 141 degrees Longitude and between 6 – 11 degrees Latitude. It consists of more than 17000 islands and its population is 241,452,952. Most of the people or about 145 million (60%) are living in along the coasts. Indonesia with its very rich diversity is also having its coastline 95, 181 km. Indonesia is vast country with numbers of: 34 Provinces (States), 98 Cities, 410 Districts, Ministry of Interior. Indonesia, by its location is facing possible disasters namely earth quake and tsunami, flood, hurricane and storm, climate change and sea level rise (SLR), and others. Since the coastal areas are mostly inhabited (145 million) and having the situation that coastal areas prone to the potential disasters therefore it is necessary to increase the capacity of the people who are living in the coastal areas. Capacity building to the people or to the community will reflect the ability of the people coping coastal hazards and disasters. That ability we may call as the community RESILIENCE to the Disaster[1]. In this paper, it was elaborated how to build the coastal community Resilience toward Potential Hazards. Even though in Coral Triangle areas quite frequent having such disasters: Climate Change, Sea Level Rise, Storm Surge, Sea Surface Temperature Rise, and Ocean Acidification, etc. This paper would elaborate: Community, Disaster, and Building Community Resilience through Partnership.

2. Community

Good Governance will rely on its Citizens. Citizens will be in Cities or Districts. Group of Citizens will establish a Community. In the Urban Governance there are 9 UNDP principles indicating Good Governance Systems, namely: *participation, transparency, accountability, equity, effectiveness and efficiency, responsiveness, rule of law, and consensus orientation*. Those criteria's will construct what so called: Districts, Cities, Citizens, Communities and Civilizations. Culture and Civilization usually will be based on tradition of group zitizens or Community. Therefore the essentials of Group Citizens will build a Community.

Then, what is the meaning or definition of "COMMUNITY". ACCORDING to Tamarack, an Institution for Community engagement, there are hundreds of definition and means the term "Community". One definition, "Community" means a support network. While traditionally geographically-bound, in which now expands to the possibility of a support network that is based on a connection of communication, sharing, honesty, "tough love" and choosing to be "related" in a supportive manner. Other definition or terms in regards to Community, A neighborhood with people, green space, kids, service and commerce, recreation, and some sense of bond between those who live there. A collection of people who share a common experience (disability, Aboriginal, seniors, youth, newcomers, foreigners, etc.), and who can work together to support each other, create things to make their lives better, and unify a voice toward better conditions in part based on their common understanding of each other's reality. Respect, solidarity, care and love for others, healthy economies rooted locally and etc.

Fig. 2. Model Diagram of Community Function (after Tamarack's)

On the other hands, in the matters of disaster management, Victoria (2008)[5] defines community as a group of individuals and households living in the same location and having the same hazard exposure, and who can share the same objectives and goals in disaster risk reduction.

By having Tamarack's views (Fig. 2) and Victoria's definition[5]. One may make an alignment idea that through community we may build up a strong society for collaboratively work in preparedness for anticipating a possible disaster in a certain region. Therefore, one of very essential activities in disaster management is so called *Community Preparedness*. NOAA through Flash Flood Early Warning System Reference Guide (2010), mentioned that Community Preparedness can be thought as the advance capacity of a community to respond to a consequences of an adverse event by having plans in place so that people know what to do and where to go if a warning is issued or hazard is observed. Thre will a correlation between Preparedness and Resilience. Whalstrom in Building Disaster Resilient

Communities (2007) described that disasters are first and foremost a"local" phenomenon ; Local communities are on the frontlines of both the immediate impact of a disaster and the initial, emergency response which experience has shown, is crucial for saving the most lives. Chandra et. al. (2011)[1], defined *Resilience* is defined as the ability of communities to withstand and mitigate the stress of a disaster, there is less clarity on the precise resilience-building process. In other words, we have limited understanding about the components that can be changed or the "levers" for action that enable communities to recover more quickly. The literature to date has identified factors likely to be correlated with achieving resilience for communities, including reducing pre-disaster vulnerabilities and conducting prevent prevention activities to minimize the negative consequences of disaster. When thinking a huge areas such as Indonesia, with 34 Provinces (States), 98 Cities, 410 Districts (Kabupaten) then we may have to work harder and harder in Building Capacity for Communities, especially in regards Community Preparedness in Disaster Management since Indonesia in the areas of Coastal Vulnerability very high.

3. Disaster

In the area of Coral Triangle mostly exposes to vulnerability due to several potential disasters such as : Climate Change, Sea Level Rise, Storm Surge, Sea Surface Temperature Rise, and Ocean Acidification, etc. The Philippines is very frequent subject and being hit by Storms and Surges as well as Land slide. Indonesia is very popular with title "Ring of Fires", so many occurrence of volcanoes eruptions, many earth quakes and potential tsunamis. All of CT 6 States are having potential disasters due to: Climate Change, Sea Level Rise, Storm Surge, Sea Surface Temperature Rise, and Ocean Acidification, etc.

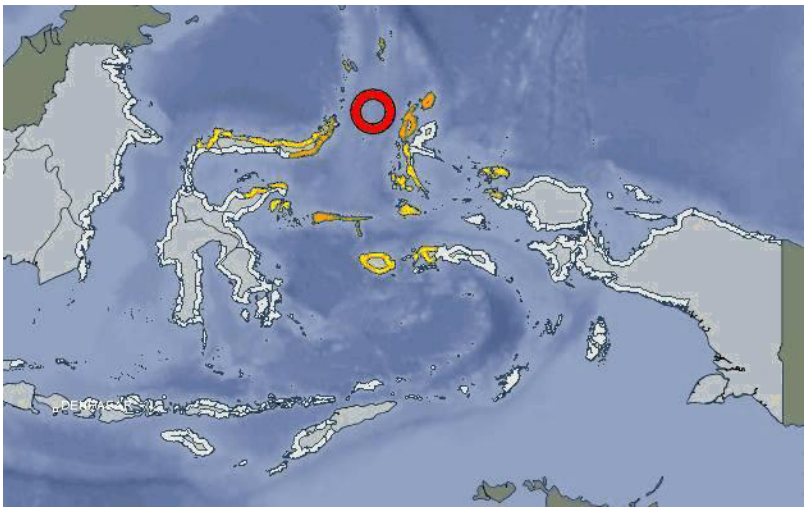

Fig. 3. 7.3 SR Earth Quake Occurrence Map nearby North Sulawesi and North Moluccas. Saturday, November 15, 2014 at 0931:44.

Recently on November 15, 2014 at 09.31 Western Indonesian Time, in Indonesia was hit by an earth Quake 7.3 SR in the Area of Northern Sulawesi, Northern Maluku Gorontalo and Papua, the center of the earth quake was 48 KM deep in the Ocean. It was a Tsunami Warning at that area (Fig. 3.1).

A natural disaster is a major adverse event resulting from natural processes of the Earth; examples include floods, volcanic eruptions, earthquakes, tsunamis, and other geologic processes. A natural disaster can cause loss of life or property damage, and typically leaves some economic damage in its wake, the severity of which depends on the affected population's resilience, or ability to recover due to their preparedness.

An adverse event will not rise to the level of a disaster if it occurs in an area without vulnerable population. In a

vulnerable area, however, such as New Orleans, New Delhi, New York, San Francisco, Tokyo, Jakarta and other highly dense City or Area (s). An earthquake or hurricane/storm, tsunami or Flood can have disastrous consequences and leave lasting damage, requiring years to repair.

World Watch Institute (2013)[6] mentioned that in 2012, there were 905 natural catastrophes worldwide, 93% of which were weather-related disasters. Overall costs were US$170 billion and insured losses $70 billion. 2012 was a moderate year. 45% were meteorological (storms), 36% were hydrological (floods), 12% were climatological (heat waves, cold waves, droughts, wildfires) and 7 % were geophysical events (earthquakes and volcanic eruptions). Between 1980 and 2011 geophysical events accounted for 14% of all natural catastrophes. In Indonesia, the most prominent disaster Floods, Volcanoes Eruptions, Earth Quakes and Tsunamis, even though Indonesia gets possibility to have tropical cyclones. In this material "Community Preparedness in Disaster Management", will be more deal with non-health disasters.

This paper consider the Natural disasters such as volcano eruptions, earth quakes and tsunamis, floods which are quite frequent occurred in Indonesia. Indonesia has many active volcanoes because it is located in the Pacific ring of fire. The volcanoes there are formed due to subduction zones between the Eurasian Plate and the Indo-Australian Plate.

One may see Fig. 4, Number of major volcanoes in Indonesia, 147. Since Indonesia is having many active volcanoes then there are many possibilities for having eruption and earth quakes. The Philippines is second after Indonesia in the CT 6 States.

Other potential natural disasters in Indonesia is Tsunami. According to World numbers of Tsunami occurrence in the world as reflected in following Fig. 5. Fig. 5. World Number of Tsunami Occurrences 1900 – 2010 based on NOAA data. Indonesia is part of the world with high probability having tsunamis.

In most of CT 6 States, are having Climate Change problems especially in the Coastal areas. Indonesia, the Philippines, the Solomon Islands are mostly islands. Those States are having more probable in the Climate Change Impacts. The climate changes will dramatically affect coastal and marine ecosystems in the Coral Triangle. Due to in common disasters, it will be very important and necessary if the Regional Secretariat of CTI CFF arranging Partnership and Collaboration with International Organization such as Tohoku University in Education and Training toward Community having Resistance in various Disasters in those areas.

Fig. 4. Number of Major Volcanoes in Indonesia

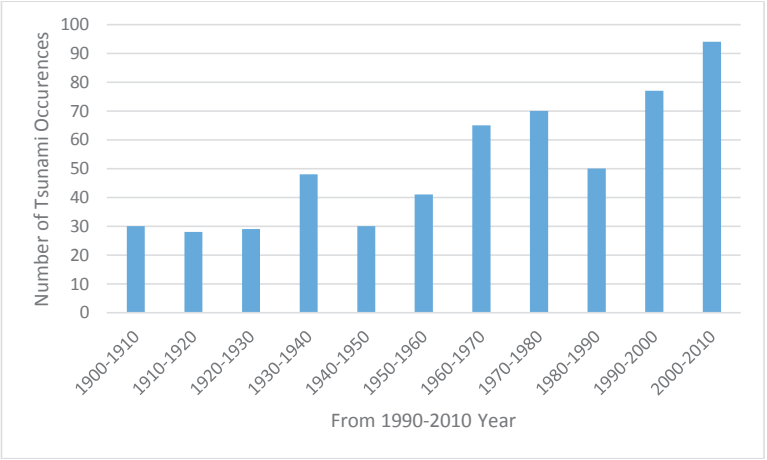

Fig. 5. World Number of Tsunami Occurrences 1900 – 2010 (Based on NOAA database)

4. Building Community Resilience to Disaster

Considering the natural disasters occurred in Indonesia, such as: floods, volcano eruption, earth quakes, tsunamis, etc. It is necessary then to have "Community Resilience in order to increase the ability to reduce risks or probability of risks on "possible potential disasters". The role of reducing death tolls, releasing stress due to disasters in the disaster occurrence depends on community preparedness and community resilience. "Preparedness and Resilience" is a pair of integrated attitude. In the community preparedness and resilience will rely on persuasive communication, as reflected in the following diagram:

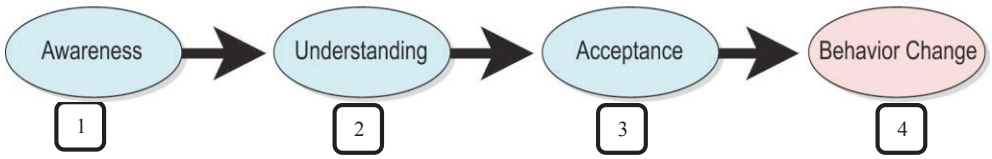

Fig. 6. Diagram Persuasive Communication[7]

In order to motivate residents to heed evacuation warnings, the residents must first be aware of their risk (**Step 1**). Second, community must understand (**Step 2**) the impacts an event may have on their family and community. Third, community must accept (**Step 3**) the idea that not following a warning message can result in injury or death. Finally, they must take action and heed the warning to evacuate (**Step 4**). If the intent is **behavior change** or ACTION (**Step 4**), then public **outreach (extension)** must focus on moving the public through the initial stages of awareness, understanding, and acceptance.

In the case of earth quake and tsunami, as an example in most of cases of Earth Quakes larger than 5.1 Richter Scale, the Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG) issues Short Message Service (SMS) to Director General Coasts, Marine and Small Islands (DG CMSI) of Ministry Marine Affairs and Fisheries (MMAF), and other related officers throughout the country, including a message whenever a potential Tsunami's development. In the 2005, it was establish a partnership between NOAA and MMAF (Ministry of Marine Affairs and Fisheries) to broadcast a Radio Message and Sirens in several Fishery Ports in Indonesia. Referring to Fig. 6, this type

activity need more training, drill and outreach support especially from University or NGO who got experience in several cases. The community preparedness and resilience is still in step 3 at the most. We need move forward to do so. In the USA, in the case of Hurricane Preparedness, communities are getting education, training, drills and exercises from extension specialists of FEMA (Federal Emergency Management Agency) or NOAA (National Oceanic Atmospheric Administration) / SEAGRANT throughout the relevant States in the USA. In Japan, the alertness mindsets toward disasters is very much. Therefore we need to more in building up, our community preparedness and resilience through Partnership and Cooperation especially with Japan and the USA. In Indonesia, a kind of Sea Grant scheme was developed and established in 2003, under the DG MCSI of MMAF; it is called as Sea Partnership Program (Program Mitra Bahari / PMB). In fact, that under the Coastal Zone Act (UU 27 / 2007; UU No 1 / 2014) it was described the role of SPP in the matters of Coastal Managements including Hazards and Disasters, refer to Fig. 7, Regional Structure of Sea Partnership Program[8].

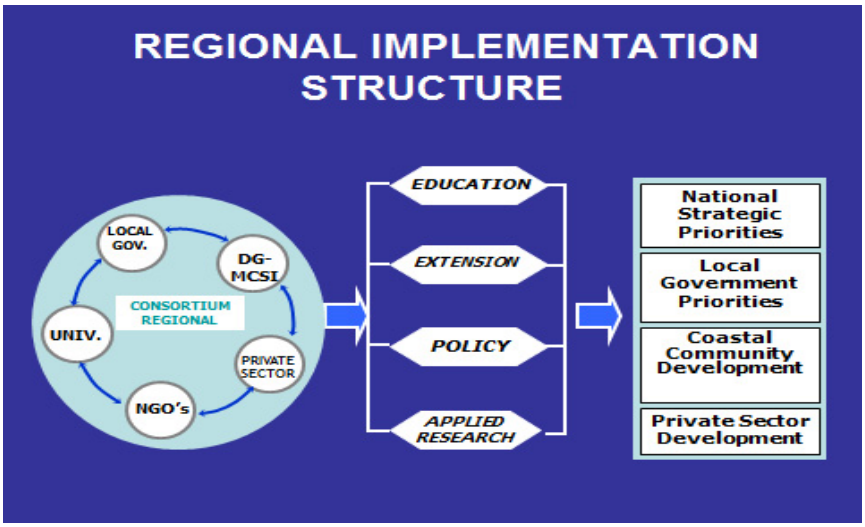

Fig. 7. Regional Structure of Sea Partnership Program (Pratikto, 2009)[6]

It will be good idea to have a kind capacity building for Community Preparedness by having Japan's experiences. Therefore, Partnership between ITS and Tohoku University may be utilized as a vehicle in giving education and training for Community Preparedness and Resilience in Disaster Management for CTI CFF member States (CT 6 States), especially for Indonesia and East Java.

5. Conclusions and Recommendations

Indonesia is vast states with 34 Provinces (States), 98 Cities, 410 Districts. Since Indonesian position in the area what so called of ring of fires therefore the probability of coastal vulnerability is very high. With Indonesia's population 241 million, and its coastal population about 145 million the impact of natural disasters are very large. It is necessary then big efforts to build up Capacity Building for Community Preparedness and Resilience in Disaster Management. The role of Government, Districts Authorities, Universities, NGOs are very crucial. We may have talks on our similarities rather than on differences, we have to embrace other through Partnership and Cooperation in order to make our planet more secure and safe besides agenda on prosperities.

Tohoku University and ITS, both having strong tradition on Coastal Matters, Engineering, Managements,

Disasters, etc. many ways and possibilities to make the two institutions closer, such as exchange Professors, Lecturers, Researchers, Students, etc. Possible joints Research and Project which will give beneficial to two Institutions. It think it is wise to suggest that this event may produce more tangible cooperation between ITS, Surabaya and Tohoku University. These kinds of collaboration and partnership between Indonesia and Japan, may be broaden for capacity building for CT 6 States. The Strength Partnership between Tohoku University and ITS Surabaya, hopefully will be giving beneficial for other States in CTI Region. The role of Regional Secretariat of CTI CFF will be very crucial in this regards. Hoping the world more peaceful and prosperous. A Model of Disaster Prevention Institute may be established for Coral Triangle area may be established through cooperation Tohoku University and Surabaya Institute of Technology.

6. References

1. Chandra, A. Building Community Resilience to Disasters, Technical Report, RAND Corporation, USA. 2011
2. CTI Forum. Climate Change Adaptation in CTI Project Sites: Batangas Province (Verde Island Passage). The Philippines. 2013
3. IRS CTI CFF. Regional Plan of Action CTI CFF, MMAF Indonesia. 2013
4. Vernon, J. et. al. Delineating the Coral Triangle. Galaxea : Journal of Coral Reef Studies. 2009
5. Victoria, L Community Based Approaches to Disaster Mitigation, Regional Workshop on Best Practices in Disaster Mitigation, Center for Disaster Preparedness, AUDMP, Asia 2008
6. World Watch Institute, (2013). Natural Catastrophes in 2012, dominated by US Weather Extremes, May, 2013.
7. Maripe, K. Journal of Sociology, Psychology and Anthropology in Practice, : Community Resilience and Disaster Risk Reduction : the role of social workers in community based disaster programs, University Botswana, Botswana. 2011
8. Pratikto W A. Development of Sea Partnership Program for Direction Materials' Meeting, MMAF, Jakarta Indonesia. 2009