

People's Knowledge, People's Defense: Utilizing Local Practices for Disaster Safety and Adaptation in Rapu-Rapu, Albay, Philippines

Jesusa Grace J. Molina

Abstrak

Kepulauan Rapu-rapu di Filipina merupakan wilayah yang dikenal sebagai daerah rawan bencana hidrometeorologikal sebagai akibat dari letak geografis dan faktor fisik wilayah tersebut. Pada tahun 2006, pulau ini mengalami bencana besar *Typhoon Reming* yang membawa dampak serius terhadap keberlangsungan hidup masyarakat yang tinggal di pulau tersebut. Berbagai dampak negatif yang diakibatkan oleh bencana ini adalah kerusakan fisik, sosial, dan ekonomi masyarakat yang mengakibatkan terdegradasinya penghidupan masyarakat.

Berdasarkan pengalaman pahit yang dialami tahun 2006 tersebut, masyarakat bertekad untuk mempersiapkan sekaligus memproteksi diri dan wilayah mereka dari potensi bencana alam tragis yang masih sangat mungkin terjadi di masa yang akan datang. Untuk itu, masyarakat lokal menginvestasikan sumber daya mereka pada berbagai program dan pengukuran pengurangan risiko bencana yang memanfaatkan kekayaan pengetahuan, kemampuan, dan budaya lokal yang dimiliki. Sebagai contohnya, masyarakat telah membangun sistem peringatan dini, lumbung pangan untuk masa krisis bencana, membentuk *bintaas*—sebuah tempat aman yang terletak di bagian atas rumah penduduk yang dimanfaatkan untuk menyimpan barang-barang berharga ketika banjir—dan menciptakan inovasi-inovasi lokal lainnya seperti peralatan pancing inovatif yang membantu mereka meningkatkan produktivitas hasil tangkapan ikan. Di samping berbagai upaya yang telah disebutkan, masyarakat juga membangun hubungan dan bekerjasama dengan berbagai organisasi, baik organisasi lokal maupun asing, untuk meningkatkan kapasitas mereka.

Makalah ini menyajikan praktek-praktek aktual masyarakat Pulau Rapu-rapu dalam mengurangi risiko bencana yang disertai dengan bukti-bukti pengalaman penggunaan pengetahuan dan kemampuan lokal sebagai salah satu ujung tombak benteng pertahanan masyarakat yang tinggal di wilayah yang berisiko tinggi terhadap bencana. Melalui makalah ini, pembaca diajak untuk kembali mempertimbangkan kekuatan kapasitas lokal dalam mengurangi bencana melalui visi dan tindakan yang aman, berdaya tahan, dan dinamis.

Kata kunci: pengetahuan lokal, kerentanan, penanganan dan adaptasi bencana, Pulau Rapu-rapu, Filipina

Introduction

The frequency of large-scale disasters induced by hydro-meteorological hazards is undeniably increasing over the past years. The occurrence of these life-threatening events brings havoc to people's lives, properties, economic activities, social practices and environment. The rising detrimental impacts of disasters in the recent years have become evident and amongst the identified culprits of such happening is the climate change phenomenon. The said phenomenon triggers episodes of extreme weather events and sea level rise. With such incidents, intensified effects of typhoons, floods, flash floods, storm surges, and droughts significantly affect the people especially those living in coastal and small island communities. The Inter-Governmental Panel on Climate Change defined small islands in their Fourth Assessment Report in 2007 as *"highly vulnerable to the impacts of climate change and sea-level rise. They comprise small land masses surrounded by ocean, and are frequently located in regions prone to natural disasters, often of a hydrometeorological and/or geological nature. In tropical areas they host relatively large populations for the area they occupy, with high growth rates and densities. Many small islands have poorly developed infrastructure and limited natural, human and economic resources, and often small island populations are dependent on marine resources to meet their protein needs. Most of their economies are reliant on a limited resource base and are subject to external forces, such as changing terms of trade, economic liberalisation, and migration flows. Adaptive capacity to climate change is generally low, though traditionally there has been some resilience in the face of environmental change"*.

Given their physical, geographical and socio-economic attributes, the inhabitants of coastal and small islands communities are highly vulnerable to the ill consequences of disaster and climate risks. Although they suffer most the fury of disasters, less attention is devoted to them. Majority of disaster risk reduction (DRR) and climate change adaptation (CCA) efforts and investments are focused at the global, regional, and national levels. This alarming situation poses the need to engage the community in addressing their vulnerabilities utilizing their intrinsic capacities. Taking into account that community is the first responders during emergencies and it is fundamental for their capacities to be harnessed and enhanced for disaster safety and resiliency. An attempt to respond to the aforementioned is the implementation of an action research under the *Strengthening Resilience of Coastal and Small Island Communities Towards Hydro-Meteorological Hazards and Climate Change Impacts (StResCom) Project* initiated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) – Jakarta with financial assistance from the Japanese Government. The project started in 2011 with the aim of reducing disaster risks and increasing the resilience of coastal and small island communities through encouraging stakeholders' involvement in preparedness, prevention, mitigation and adaptive activities using their local and indigenous knowledge

(LINK). UNESCO-Jakarta defined LINK as “cumulative and complex bodies of knowledge, know-how, practices and representations that are maintained and developed by people with extended histories of interactions with the natural environment. Such knowledge based on the experiences and observations of peoples over generations can contribute to an increased understanding of climate change and help develop community-level adaptation strategies”. The undertaking is also keen to promoting the integration of LINK with science-based knowledge as well as the development of community action plans for DRR and CCA with special focus on hydro-meteorological hazards.

The municipal island of Rapu-Rapu is one of the project sites considering that it is comprised of coastal barangays which are highly susceptible to the threats of disasters and climate change. With the aid of social integration, focus group discussions, key informant interviews, participation in community activities, workshop, and consultations with the community residents, the wealth of LINK which people use for DRR and CCA in the coastal municipality was surfaced. The indigenous knowledge and skills have become their fundamental weapon during disaster events. Specifically, their inherent capacities are used for early warning in times of emergencies, food preservation, livelihood and construction of safer housing. Over time, the people depended on these collections of LINK and have learned to enhance them for safety, adaptation and survival.

Rapu-Rapu and Its Vulnerabilities and Hazards

Rapu-Rapu is the sole island municipality belonging to the province of Albay in the Bicol Region. It is composed of thirty four (34) barangays¹ covered by the three small islands that form the municipality namely Rapu-Rapu, Batan and Guinangayan. The topography of the area is characterized by narrow coastal plains, rolling-to-steep slopes and mountains. Coastal and aquatic resources are abundant in the area making fishing as the top economic activity of the residents. A significant portion of its dwellers also engage in agriculture for subsistence. Apart from fishing and farming, it is a host to a big Polymetallic Mining Project which is also a source of income for the locals.

The whole municipality has a land area of 16,180 hectares inhabited by a total population of 38, 924 individuals (7,567 households). The earliest inhabitants of the area are from Catanduanes and were later followed by migrant settlers from Albay and other provinces in the Philippines. There are also residents belonging to various ethnic groups (i.e. *Maguindanaos*, *Maranaws*, *Surigaonons*, *Zamboanguenos* and *Tausugs* from Mindanao and *Cebuanos*, *Boholanos*, *Aklanons*, *Ilonggos* and *Warays* from the Visayas) possibly because of inter-marriages and influx of migrants prompted by the thriving

¹ Barangay (village) is the smallest administrative unit in the Philippine society

fishing and mining businesses (Risk Asia Consulting, Inc., 2006). The indigenous group called *Agtang Tabangnon* are the majority of ethnic dwellers of the municipality. They belong to the 23, 270 Agta people in the Bicol Region listed by the National Commission for Indigenous Peoples (NCIP). The *Agtang Tabangnon* descended from parents of a pure *Agta* and native lowlanders. Roman Catholicism remains to be the predominant religion in the island municipality.

Considering that the municipality is isolated from hospitals and other advanced medical facilities given its island nature, most of its inhabitants believe and engage into traditional healing practices using herbal plants and other animals as remedy for their illnesses.

Despite being categorized as a 2nd class municipality, Rapu-Rapu still exhibits a poverty-stricken image which exacerbates its vulnerability to multiple hazards. The locals are confronted with problems in meeting their basic needs. In general, food production in the municipality is insufficient. Many food items, including meat, poultry and vegetables, excluding fish are imported from the mainland Albay or Legazpi City. In spite of the abounding marine resources, perpetuation of destructive practices such illegal fishing destroyed the coral reefs resulting to the attenuation of fish catch. Quarrying of gravel and coral sand as well as the continuous mining operation have also contributed to the threatened state of the coastal resources. In terms of shelter, 56% of houses in the municipality are made of light materials while 24% are semi-concrete and the concrete houses comprise the 20% remaining (ASCEND Participatory Capacity and Vulnerability Assessment Result, June 2011).

Access to social services is also a challenge that locals have to deal with. Among the concrete manifestations of the said issues are the following: insufficient health facilities and services; poor school and learning facilities; inadequate social and agricultural infrastructures; irregular supply of electricity; poor road networks; weak internal and external communication system and; limited participation of people in local governance (Coastal Core Sorsogon, 2011).

The abovementioned socio-economic vulnerable conditions of Rapu-Rapu have escalated its exposure to hydro-meteorological hazards. It is not to mention its physical and geographical characteristics which also make it prone to multiple hazards. This is not only true for the municipality but for the whole province of Albay as well. The island municipality is susceptible to strong and frequent typhoons, storm surges, sudden swells, small tornadoes, north-eastern (*amihan*) and south-western monsoon (*habagat*), prolong rainy season/tail-end of the cold front, flood, and rain-induced landslides, sea level rise and coastal erosion. Earthquake and its associated hazards (i.e.

liquefaction, landslide and tsunami) are also deemed to be threats to people’s lives.

Majority of the barangays that make up the island municipality are located in the coastal plains, low lying areas and some are also directly facing the Pacific Ocean. Such condition exposes many of the inhabitants at-risk to strong winds, storm surges, floods, landslides and tsunami. In the recent years, the locals have noticed changes in the frequency of occurrence and the scale of impacts of various disasters. Extreme weather events triggered stronger typhoons, greater inundation, severe winds and higher storm surges. Isolation, food shortage, health risks, disruption of livelihoods, damage to properties and loss of lives are among the identified bitter upshots of extreme weather events that defy the community.

Table 1:
The risk assessment results on affected families per identified hazard of the community:

IDENTIFIED HAZARDS OF RAPU-RAPU	TOTAL NUMBER OF FAMILIES AFFECTED	TOTAL NUMBER OF POPULATION AFFECTED
Tsunami	4,358	20,840
Landslide	666	3,104
Storm Surge	2,587	11,905
Strong winds	5,611	19,274
Flood	1,253	6,079
Flashfloods	102	1,162
Subsidence	3	15

Source: Christian Aid and Coastal CORE’s ASCEND project in 2010-2011

From the accounts of the people, Typhoon Reming (International name: Durian) is considered as the worst disaster that ever hit the island municipality. According to the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), this typhoon is also worst in the country in terms of gustiness. It happened in November 2006. Many houses have collapsed and incurred great damage particularly those made of light and scrap materials. Due to extreme heavy downpour, it was zero visibility. Chest-deep inundation and storm surges which both measured approximately 4 feet were experienced by them. In Caracaran, one of its barangays, the people have narrated that the winds produced a whistle-like sound and hit the walls and windows. Such wind intensity has blown the roofs of houses away as well as pushed boats and big rocks inside the houses.

Besides the aforesaid, the following changes have been observed by the locals in the recent years: shorter distance of shoreline from the constructed

houses, physical landscape and contours, extended wet season, extreme dry season and decrease in fish yield.

Local and Indigenous DRR and CCA Practices and Initiatives

The multi-faceted vulnerabilities of the island municipality prompted its people to make use and develop their LINK to ensure their protection as first responder in the event of a disaster. The locals possess inherent knowledge, skills and attitude which they use to prepare for, prevent and mitigate, and recover from disasters. Additionally, their wealth of LINK also serves as their coping and adaptive mechanism to the inevitable emergence of climate risks. Through time, their indigenous capacities have been challenged by the worsening impacts of life-threatening events triggered by hydro-meteorological and geological hazards, human activities and climate change. Their constant encounter with hazards of varying nature also enable them to further enhance their LINK for the achievement of sustainable development and culture of safety.

The inhabitants of Rapu-Rapu depend on manifold sources of local and indigenous knowledge which they employ for DRR and CCA agenda. Amongst these sources include animal behavior, wind movement, cloud formation, celestial bodies, traditional practices, faith and actual observation in the environment. Apart from the aforementioned, the locality's past experiences have also enriched their existing capacities which equipped them with brilliant ideas and relevant skills to facilitate innovations in the provision of early warning, livelihood, food production and preservation and housing construction. The LINK sources and its practical application have become their shield and mechanism for survival amidst disasters, deteriorating environmental condition and a changing climate.

Various animals from land and water have been identified by the dwellers of coastal communities to be effective in relaying early warning for an approaching bad weather. The observance of their unusual behaviour and movements alert them to protect their lives and secure their properties. Considering that these areas don't have regular access to television and radio for up-to-date weather forecasts, the local people have largely depended on these animals for alert which enable them to execute corresponding preparedness actions. The island inhabitants have recognized the vital role of certain species of birds, insects, reptiles, sea shells and other marine creatures in early warning. In fact, these evident animal actions are incorporated in the early warning system (EWS) of the barangay and municipal contingency plans. Among the commonly seen warning signs for heavy rains include a jumping stingray, a flying duck and ants crawling upward.

Besides animal behaviour, the locals have also relied on celestial bodies like the moon and the stars as early warning instruments. Their location and

color provide useful information on an impending typhoon and other related hazards. In addition, the color and formation of clouds as well as the wind movement are likewise identified to have a fundamental role in making the community more vigilant. A moon surrounded by rainbow or reddish color and presence of half rainbow in the sky denote either the coming of a typhoon, strong winds or storm surges.

The observation of actual happenings in their natural surroundings particularly in the plants and trees, the sea, and the nearby island provide them with essential information for preparedness and performance of their economic activities. The people believe that when the sea emits strong fish-like smell, locally called *malansa*, strong winds, storm surges and typhoon may be experienced. On the other hand, when *barbo tree* bears fruit, hunger will be experienced in the area.

The island municipality's residents have also utilized their traditional practices and material culture technology for securing their livelihoods. A sustainable economic activity is crucial to achieve resiliency since it determines one's capacity to provide the basic needs of his or her family. Taking into account the deleterious environmental changes spurred by both natural and anthropogenic factors, the people have utilized such beliefs and customs to attain greater harvest. Their unsustainable and destructive practices have greatly affected the marine and land resources which endanger not only the future of present population but of the next generation as well. One prominent example of their traditional practices is *pagtutuob*, a ritual done by burning incense together with *bariw and binit* leaves with the aid of charcoal. Apart from the said leaves, some residents also burn chicken feathers, *amorseko* (a type of plant), lemon grass, ginger, and palm. The smoke produced out of the burnt materials is brought around the boat while a prayer is being uttered. Part of the ritual is hitting the boat inside with *binit* leaves. This is normally done during the season when the fish catch is low.

The island settlers have also exhibited initiatives to utilize indigenous resources and materials for their economic advantage and safety. Specifically, these innovations have been used for fishing, farming and early warning. One of these is *bodyong*, a horn made up of big sea shell, used as a warning device in the community. For ensuring better yield, local fishermen also engaged in using *buyod-buyod*, a shrimp-like figure that serves as bait to catch *kulambutan* (big squid) and octopus. Other than *buyod-buyod*, *pangugita* (also known as *rambo*), a fishing gear made of black umbrella or clothing, also acts as bait for octopus. Moreover, a locally grown plant commonly found in mountains called *karagumoy* (pandan leaf) is also utilized as a raw material for making mats and baskets. Weaving of said native products is one of the alternative livelihoods when fishing is not possible due to weather disturbances. Women from the *Agtang Tabangnon* group and low lands are involved in this activity.

Given the fact that food sources are intermittent during disaster events, the inhabitants of Rapu-Rapu have also embarked on food preservation techniques to ensure their nourishment. Amongst these techniques are the production of starch from cassava; drying, smoking and salting of fish; and drying of *gabi* (taro) leaves. Other than the abovementioned, a distinctive food preservation technique done by the locals particularly the *Agtang Tabangnon* is called *kalot* where they excavate a portion of the land to make a hole. Root crops like camote and cassava are usually stored inside the hole and filled with soil. The possibility of rotting is reduced and the stored root crops can be consumed up to a month's time. One of the natives recounted that the burrowed hole serves as their refrigerator.

Since the barangays of the municipality are coastal in nature, flood induced by storm surge or typhoon is also a constant hazard that its people have to face and prepare for. In response to this, the locals made an initiative to construct a safer housing structure. Most of the houses in the island municipality have an elevated space called *bintaas* to secure their belongings and other important documents from inundation. In regular days, the *bintaas* serves as a stock room for storing bulky things which are not used regularly. This also helps in saving space.

Although it may seem to appear that the residents of Rapu-Rapu have purely utilized LINK for DRR and CCA concerns, an effort to harmonize science-based knowledge to their initiatives was also realized. This came into being through the assistance of Building Disaster Resilient Small Island Communities Project (BDRSIP) and *Advancing Safer Communities and Environment Against Disaster (ASCEND) Project* jointly implemented by Coastal Core Sorsogon and Christian Aid. These undertakings provided opportunities for the locals to strengthen their LINK as well as acquire new capacities that will allow them to become better DRR and CCA actors. A series of capacity building activities have been conducted for them and these included Basic Orientation on DRR and CCA; Participatory Capacity and Vulnerability Assessment (PCVA); Emergency Response and Assessment; First Aid and Basic Life Support (BLS); Water Search and Rescue (WASAR), Information and Communication Workshop and Municipal Contingency Planning.

The Participatory Capacity and Vulnerability Assessment (PCVA) conducted in the communities with the involvement of Barangay Council, Barangay Health Workers, Barangay *Tanod* (police), teachers, volunteers, women, youth, elderly and indigenous people. They became the basis for crafting their contingency plans where hazard-specific early warning system, evacuation plan and communication protocol are incorporated. The PCVA became an avenue to collectively study the hazards, risks and threats of their locality as well as the skills and knowledge that the people utilize it to withstand the adverse impacts of possible disasters. Each barangay came

up with their own hazard map featuring the dangerous and safe areas to typhoons, landslides and tsunamis. The map also helped them in identifying the safe and elevated places where they can evacuate.

Along with the PCVA, the barangay was also able to organize its disaster risk management committee which is currently referred to as the Barangay Disaster Risk Reduction and Management Committee (BDRRMC). This organization is the lead body in the barangay that handles disaster risk reduction and climate change adaptation issues and concerns. The BDRRMC is composed of representatives from the Barangay Council, Barangay Health Workers, Barangay Nutrition Scholar, youth, elementary school, elderly, *purok* leaders and indigenous people. Various committees were also formed to ensure system, clear delineation of roles and effective performance of tasks. Among the organized committees included the following: communication, transportation, supply, security, warning, evacuation management, warning, rescue and retrieval, relief, damage control and medical (Molina, 2012).

Using the results of the PCVA, contingency planning was carried out to determine priority actions to be done by key stakeholders for specific hazards. To test their plans, a simulation was also organized to see the gaps and the things that need to be improved.

Conclusions

The collection of DRR and CCA LINK of Rapu-Rapu is greatly dependent on the environmental which its people inhabit. The wealth of local practices and skills of the residents also reflect the kind of culture and lifestyle they have. This is supported by the description of Ellen (2000) to indigenous knowledge as rooted to a particular place and generated by people living in those places. Those who live in the mountains like the Agtang Tabangnon employ indigenous practices related to land-based activities like agriculture (i.e. *kalot*). Meanwhile, those who dwell near the coastal plains make use of knowledge mainly sourced from the behaviour of marine creatures and observations in the sea waters. Furthermore, they also have practices linked to coastal-based activities like fishing (i.e. *pagtutuob*). These practices are geared towards economic subsistence and safety.

The natural surroundings of the people play a vital role as a rich source of indigenous knowledge and skills. The animals, plants, clouds and celestial bodies give them valuable information related to early warning. Given their rural and coastal setting, the people have closer interaction with the living things found in their natural environment as compared to the urban areas where buildings have sprawled and advanced technology created individualism.

The existing LINK that people have can be applied in manifold vital activities for their safety and from the increasing disaster and climate risks. The communities have their own beliefs and practices for early warning provision, food production and preservation, safer housing and sustainable livelihoods. These developed over time and have been enriched by the experiences of different generations.

The various local and indigenous practices in the coastal communities are sustained given that they are only small in land area. Such condition made it possible for the transfer of knowledge to easily transpire among families, relatives and neighbours. Being family oriented is an evident feature of the people inhabiting the coastal barangays. This value helps in sustaining the LINK since it is continuously passed on from one generation to another. Although, the local knowledge and practices are not documented, they are able to share it informally, mostly through informal conversations. In most cases, the LINK already existed even before the current residents were born. They have witnessed their grandparents and parents doing such practices and this encouraged them to adapt the same.

Changes brought about by natural forces, environmental degradation and human activities have also encouraged the people to implement and innovate coping strategies to survive physically and economically. This is particularly in the case of fishermen who are confronted with problems on low fish catch in the recent years. In the past, they can catch a lot even by just staying at the shoreline. However, at present, even if they go to the sea and stay there for a day, they only get minimal harvest. With this dilemma, they have utilized fishing gears that will help them augment their harvest (i.e. *buyod-buyod*, *bubo*, and *pangugita* or *rambo*). This is an attestation to the accounts of Ellen (2000) describing indigenous knowledge as *"a consequence of practical engagement in everyday life; it is constantly changing, being produced as well as reproduced, discovered as well as lost"*.

The people's high exposure and vulnerability to disaster and climate risks have also prompted them to harness their LINK. Considering that they are constantly battered by hydro-meteorological hazards (i.e. typhoon, storm surges and heavy rains), the people have exhibited the initiative to seek ways to reduce the disaster risks and adapt with the changing climate. The major disaster experiences they have encountered such as Typhoon Reming imparted them with significant lessons which guide them to enhance their current DRR and CCA initiatives.

Despite the richness of the island barangays in local knowledge and practices on DRR and CCA, it is a sad fact that some have already vanished over time. There are multiple factors which contributed to why the people have stopped from engaging into such practices which eventually led to its disappearance. One of these factors is the presence of modern technology. The

young generation exhibits less reliance to some LINK because of their exposure to media and advanced technology where they derive useful information on weather updates and forecasts. This also contributes in nurturing the notion that the indigenous knowledge and practices are just superstitious beliefs.

Apart from the advent of technology, the changing climate also affected the performance of some traditional practices (i.e. *kalot*). Given the change in the soil temperature due to the extreme climate (too warm and too cold), storing of food in the soil is not feasible anymore since it becomes prone to rotting.

The role of an external organization was fundamental in inculcating a culture of safety in the coastal communities of Rapu-Rapu. It helped in establishing DRR and CCA initiatives which empowered and taught the people embrace proactive ways of responding to disaster and climate risks. With the aid of the BDRSIP and ASCEND projects, the people learned the importance of disaster preparedness and climate change adaptation. They underwent various capacity building activities to equip them with right knowledge, skills and attitude.

Good governance is also key factor to achieve sustainability of any development work including DRR and CCA. Officials from the Municipal Local Government Unit and Barangay Council should indeed work hand in hand as well as exemplify willingness to serve the people. Their commitment is fundamental to continue whatever has been started. Since they are the ones legally mandated to do such, it is important that they are held accountable in fulfilling their duties and obligations. The formation of the Barangay Disaster Risk Reduction and Management Committee (BDRRMC) became an effective mechanism for the Council to exercise leadership and hard work. Furthermore, presence of strong political will is crucial in any endeavour to succeed since the leaders' support is guaranteed.

Partnership building is also essential to successfully implement DRR and CCA initiatives. Through establishing linkages with different stakeholders from the national scale down to the local, greater support is mobilized. Resources of all kinds (i.e. financial, material, social, technical) are also generated leading to an improved implementation of community initiatives that will benefit a greater population. The ASCEND project was instrumental in facilitating partnership across different sectors (i.e. women, elderly, youth, education, health) and they worked together in realizing different activities geared towards the reduction of risks (i.e. mangrove planting, PCVA and contingency planning).

Multi-stakeholder participation remains a critical factor to ensure the longevity of DRR and CCA initiatives. When community people from manifold sectors are involved, sense of ownership and empowerment are also

instilled on them. The local people were encouraged to actively participate in various capacity building activities through the help of the BDRSIP and ASCEND projects. Their involvement provided them an avenue to let their voices be heard and exercise their role as able actors. These voices reflect their pertinent issues, concerns and needs that need to be addressed to ensure safety, resiliency and development.

Provision of basic community services and facilities (i.e. water supply and secondary school) is also a priority concern that has to be dealt with by the local government unit (LGU) in order to reduce people's vulnerability to disaster and climate risks. This is particularly in the case of the *Agtang Tabangnon* people who do not have access to clean water. This increases their vulnerability to water-borne diseases during regular days and more so during disaster events.

Provision of alternative livelihood activities is also deemed important since the absence of economic opportunities especially for those who were not able to finish their studies encourage the people to resort to destructive income generating activities (i.e. illegal fishing). ●

References

- Bugtong, Chavez, de Chavez, Raymond & Corpuz, Victoria eds. 2009. *Guide on Climate Change Adaptation and Indigenous Peoples*. Baguio City: Tebtebba Foundation Byg, Anja, Salick, Jan. 2007. *Indigenous Peoples and Climate Change*. Oxford: Tyndall Centre for Climate Change Research.
- Ellen et al. 2000. *Indigenous Environmental Knowledge and its Transformations Critical Anthropological Perspectives*.
- Hewitt Kenneth. 2012. *Culture Hazard and Disaster*. Wisner, Gaillard and Kelman. *The Routledge Handbook of Hazards and Disaster Risk Reduction*. New York: Routledge.
- Mercer, Jessica. 2012. *Knowledge and Disaster Risk Reduction*. Wisner, Gaillard and Kelman. *The Routledge Handbook of Hazards and Disaster Risk Reduction*. New York: Routledge.
- Mimura, Nobuo. 1999. "Vulnerability of island countries in the South Pacific to sea level rise and climate change". *Climate Research*, Vol. 12.
- Municipal Government of Rapu-Rapu. 2007. *Rapu-Rapu Socio-Economic & Physical Profile*.
- Mwaura, Peter. 2008. *Indigenous Knowledge in Disaster Management in Africa*. Nairobi: United Nations Environment Programme.
- Oliver-Smith, Anthony & Hoffman, Susanna M. 2002. *Why Anthropologists Should Study Disasters*. In *Catastrophe and Culture: the anthropology of disaster*. Oxford: J. Curry.

- Oxfam. 2011. *Rising to the Call: Good Practices in Disaster Risk Reduction and Climate Change Adaptation in the Philippines*. Oxfam Pandaliday, Abowanas M. Liguasan. 1998. "Marsh Biodiversity: People-Based Initiative for Conservation and Protection" in *People Earth and Culture*. Los banos: Laguna: PCARRD-NCCA (Book Series No 165).
- Participatory Capacity and Vulnerability Assessment Results under the ASCEND Project (June 2011).
- Pernetta, John C. 1992. "Impacts of climate change and sea-level rise on small island states: National and international responses," *Global Environmental Change*, Vol. 2, No. 1, March.
- Risk Asia Consulting. 2006. "Fool's Gold: The false economic promises of the Lafayette mining project in Rapu Rapu". A report submitted for Greenpeace Southeast Asia.
- Victoria L. 2007. "Local Knowledge and Practices for Disaster Preparedness and Mitigation in Addressing Coastal Security Through Natural and Man-made Hazards Prevention and Management". *Tropical Coast*, Vol. 14 No 2.