

# Geography and Public Planning: Albay and Disaster Risk Management

Agnes Espinas

HDN DISCUSSION PAPER SERIES

PHDR ISSUE 2012/2013

NO. 4



HDN Discussion Papers are commissioned by HDN for the purpose of producing the Philippine Human Development Reports. This research is funded by the United Nations Development Programme (UNDP). Papers under the Discussion Paper Series are unedited and unreviewed.

The views and opinions expressed are those of the author(s) and do not necessarily reflect those of the Network. Not for quotation without permission from the author(s) and the Network.

**For comments, suggestions and further inquiries, please contact:**

Room 334, School of Economics, University of the Philippines, Diliman, Quezon City  
+632-927-8009 +632-927-9686 loc.334 <http://www.hdn.org.ph>

# **GEOGRAPHY AND PUBLIC PLANNING: Albay and Disaster Risk Management**

Agnes Espinas

## **I. INTRODUCTION**

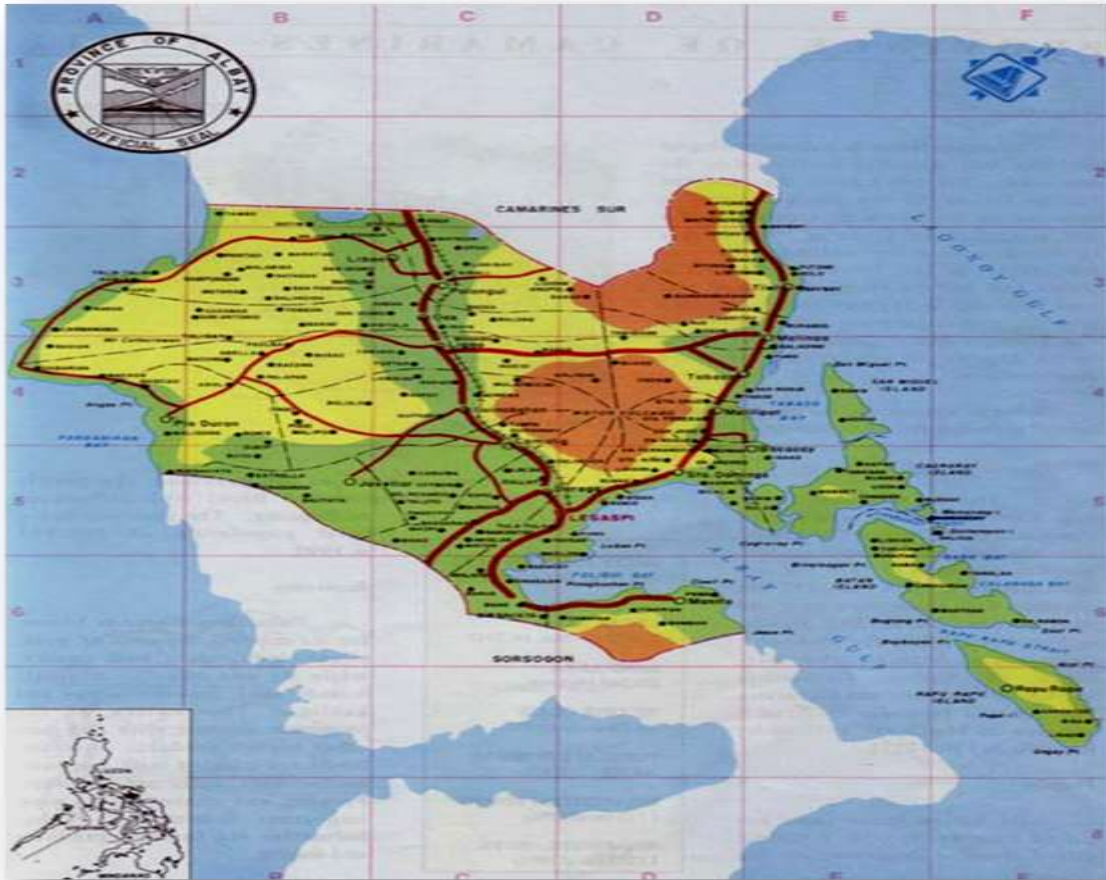
Geologic characteristics and natural features are determinants of development. In the Philippines, where topographic variation is apparent, the level of development can be associated with the physical characteristics of an area. The pace of economic growth may be hampered as environmental processes and phenomena brought about by topographic variations pose as constraints and limitations to development initiatives in the different parts of the country.

This study takes off from the influence of geography on disasters as environmental phenomena that influences the course of development. It focuses on the province of Albay and how it rises to the challenge of its geography which, because of its location and geologic character, rendered it vulnerable to risks and hazards brought about by disasters. Purposely, the study will review the institutional creation and reforms and the policies and strategies formulated for all sectors that aimed to address the negative impacts of the disasters and the vulnerability of the communities in the province. It will further examine the responsiveness of the institutional arrangements and the success factors and constraints from where lessons could be drawn from the systems, policies and strategies implemented by province.

### **A. Albay: Its Geography and Vulnerability to Hazards**

#### **1. Albay's Geographical Description**

Albay lies at the southern tip of Luzon Island and about 550 kilometres from Manila. It is approximately 13 to 13.5 degrees north latitude and 123.25 to 124.25 degrees east longitude. It is bounded by Lagonoy Gulf and the province of Camarines Sur in the northwest, the Pacific Ocean in the east, the Province of Sorsogon in the south, and the Burias Pass in the southeast. (See Figure 1: Location Map of Albay Province). It has a total land area of 2,552.6 square kilometres politically subdivided into three cities and 15 municipalities. Population as of the 2000 census reached to about 1.09 million with an average density of 428 persons per square kilometre. The province's economy is primarily agriculture-based with main products of coconut, rice, sugar and abaca. (Albay DRRM Plan: 2009:1)



Source: <http://www.islandsproperties.com/maps/albay.htm>

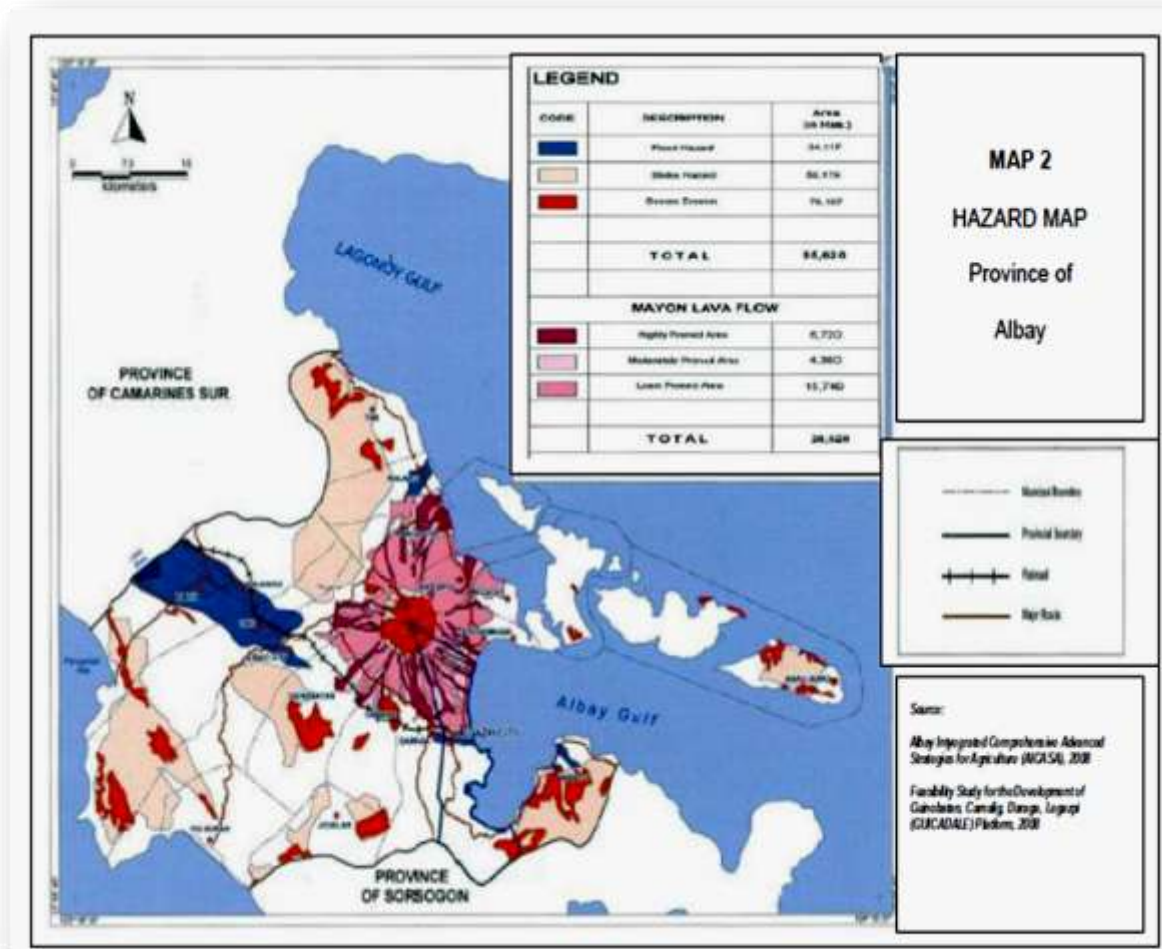
**Figure 1: Location Map of Albay Province**

In the Provincial Development and Physical Framework Plan (PDPFP, 2011-2016), the province is described to be *located in the eastern seaboard of the country and subjected to the pressures and consequent effects of the Pacific Jinx*. It is referred to as such because of its geographic location, that of being situated along the Pacific Ring of Fire making it vulnerable to earthquake, tsunami and volcanic hazards and along the Western Pacific Basin which is a generator of climatic conditions such as typhoons, monsoon rains, and thunderstorms, among others. These cause the province to experience more pronounced distribution of precipitation and no pronounced dry season all-year round. Because of its geographic location, volcanism, physiographic and hydro-geologic nature, the province becomes vulnerable to disasters and to the effects of climate change as well.

## **2. Vulnerability to Natural Hazards**

Natural hazards in the province as herein presented are generally classified in two categories: (1) the geologic hazards, and (2) the hydrometeorologic hazards. Geologic hazards include the earthquake-induced hazards and the volcanic hazards while hydrometeorologic include the typhoons/tropical cycles, storm surge, floods and flashfloods; tsunami and landslides. Figure 2 shows the hazards map of the province. Hazards depicted in the map are flooding (dark

blue), landslides (flesh), severe erosion (red), and the areas prone to lava flow from the Mayon Volcano from high to least prone areas.



Source: PDPFP 2011-2016

**Figure 2: Hazards Map of the Albay Province**

*a. The Geologic Hazards*

i. Earthquake

Albay experiences quakes generated by the trenches and active faults (tectonic earthquakes) as well as by the active volcanoes (volcanic earthquakes), closest of which is the Mayon volcano situated almost at the heart of the province. An estimate of 42,500 households or 5.3 % of the total population of the province is considered at risk from earthquakes. (PDPFP, 2011-2016:17) Similarly at risk are the properties and structures exposed to the hazards whenever the quakes occur.

## ii. Volcanic Hazards

During eruptions of Mayon Volcano, a total of 86 barangays within the three cities and six municipalities are considered at risk from (a) pyroclastic flow; (b) ash fall; (c) volcanic avalanche; (d) lava flow; (e) mud flow; and (f) lava fountaining; among others. Most affected are the barangays located within the six-kilometer radius permanent danger zone (PDZ) and the eight-kilometer radius extended danger zones. A total of 1675 families are categorically at risk within the 6-kilometers PDZ of the volcano (as of September 2010). (PDPFP, 2011-216: 17)

### *b. Hydrometeorologic Hazards*

#### i. Typhoons/Tropical Cyclones

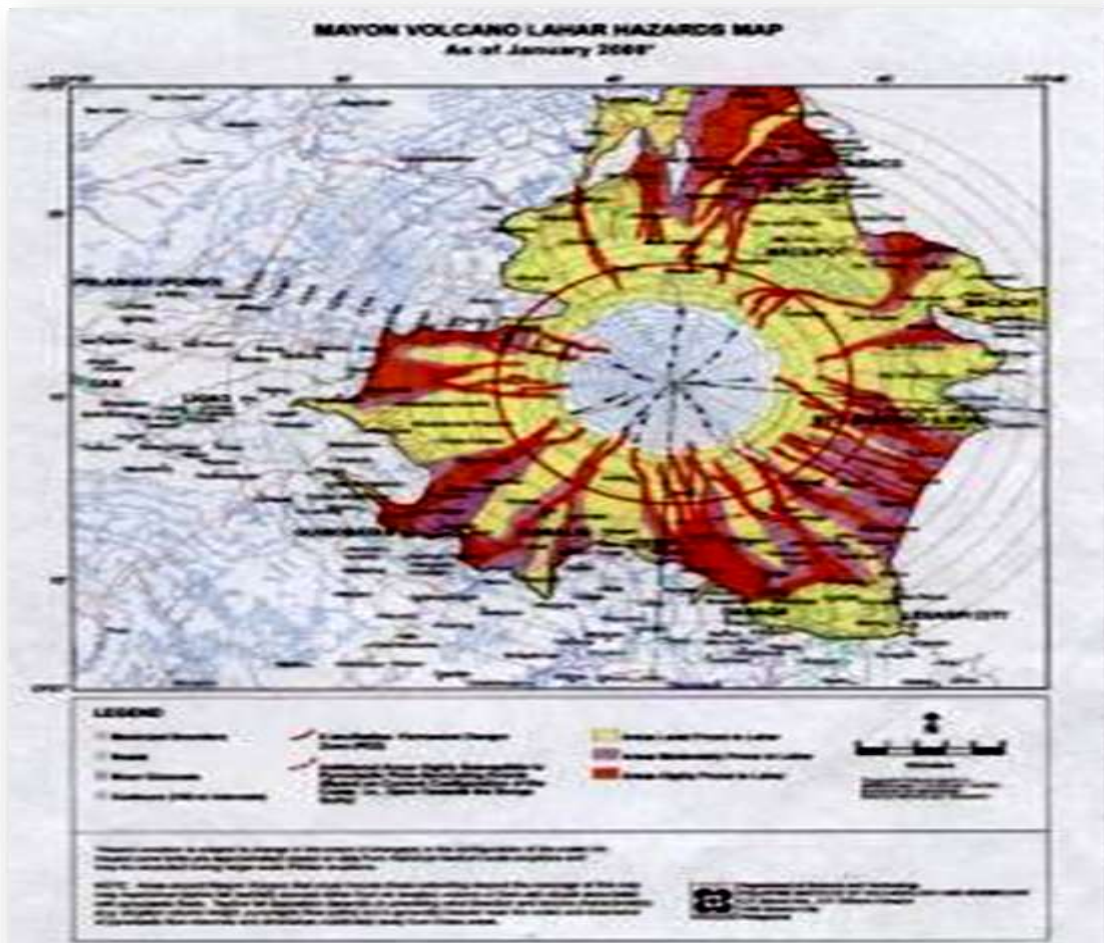
Albay, which lies on the eastern seaboard and is one of the areas first reached by landfalling tropical cyclones, experiences an average visit of 20 tropical cyclones each year with an average of two major destructive typhoons per year. In November 2006, it was hardest-hit by typhoon Reming which was one of the most deadly and destructive tropical cyclones in the record of history of the country. The typhoon brought 466 millimetres of rainfall, the highest in 40 years. (<http://www.microdis-eu.be/content/albay-philippines>). That rainfall caused debris and volcanic materials from the slopes of Mayon Volcano to rush down as mudflows that buried the communities lying at the footslopes of the volcano. Aside from Reming, three other major typhoons hit the province in 2006 and also the succeeding year. These typhoons caused flashfloods and landslides in the affected areas. Figure 3 below depicts the risks to the province brought about by the occurrence of typhoon with those in dark blue showing the very high risk areas. High risk areas are determined by three factors which are: (1) high rainfall increase; (2) highly populated areas/high density; and (3) high poverty incidence.

#### ii. Flood, Lahar and Mudflow

An estimated 12,190 hectares of the province are continually suffering from flood hazards during rainy season. There are several built-up areas throughout Albay that are annually constrained by flood, most especially the coastal communities. Generally, 396 out of the total 720 barangays of the province are experiencing flood hazards during heavy rains.

Mudflow is one of the most destructive effects of typhoon in areas near an active volcano and in areas prone to landslide. During the Super Typhoon Reming destructions were caused in part by rampaging mudflows and lahar flows from the channels of Mayon Volcano (see Figure 4). Three cities and five municipalities nestled around the volcano are constantly threatened by mudflows and lahar. The magnitude of devastation caused by Reming resulted to mass permanent relocation into safer grounds of about 10,076 families. (PDPFP, 2011-216: 15) An entire barangay was relocated to another barangay within the municipality to ensure the safety of the residents.





Source: PDPFP, 2011-2016

**Figure 4: Mayon Volcano Lahar Hazards Map**

*iv. Landslide and Soil Erosion*

About 73% of the province's total land area is vulnerable to landslide and soil erosion owing to its mountainous terrain. Strong earthquake and heavy rainfall cause landslide in areas with steep slopes and clayey soils. Soil erosion is rampant in less vegetated areas exposed to strong winds and as also caused by water runoff during high precipitation. As recorded by APSEMO, a total of about 11,000 to 12,000 families located within the high risk area are threatened by landslide in 127 barangays of the province. (PDPFP, 2011-216:10)

The foregoing discussion provides a picture of the province's vulnerability to disasters. It is shown that both the population and the resources are at risk at varying degrees. Figure 5 depicts Albay as a very high risk area for climate related disasters aside from the geologic hazards that are likewise present in the locality.



the practice, common folks observe natural phenomenon that they associate with the onset of calamities such as volcanic eruptions. This is particularly true in the communities surrounding the slopes of the volcano. Their observations include changes in animal behaviour to the drying up of wells in their vicinity. These are what forms part of the early warning system practiced by the communities.

During calamities, before any organization for disaster response has been created at the barangay level, people are forewarned of impending calamities by the tolling of church bells. In some areas, people are informed by a 'town crier' or what is called *bandillo* in the vernacular, as designated by the barangay officials. Remote areas, however, have no other way of being informed as these means of information dissemination are not available. Others would rely on radio broadcasts to get updates on the status of typhoons and other calamities.

The manner of coping with disaster does not observe any system or program of actions. Most of the communities are left on their own to decide on the most appropriate measure for them to avoid the impact of disasters. In most cases they rely on their own judgment to determine when to move to safer grounds. They provide for their own transportation to go to evacuation centers or move in with other relatives in unaffected areas. Only when they have been relocated to the evacuation centers, which are usually the public schools and other public building, would they have access to some provisions for food, clothing and medicines. While local officials also take responsibility for the safety of their constituents, there are no established protocols to be observed and no plans are ready for implementation whenever disasters happen in their respective areas.

## **B. Disaster Response to Disaster Risk Reduction: A Paradigm Shift**

Prior to 1989, *Albay's disaster risk management strategy was mainly an after-the-fact-disaster response*. (Romero, 2008:6) The approach of the provincial government, the key government agencies, and the partner institutions like non-government organizations, was generally responsive and reactive to calamities and that preparedness is sought within the shorter period rather than a long term endeavour. Primarily, the activities are focused on the safety of the affected families and the provision of relief assistance during the calamity.

The disaster-related activities of member agencies can be categorically considered more in the nature of an ad-hoc rather than part of their regular functions. Disaster control group and reaction teams are activated or only organized at the onset of major calamities. Activities include the issuance of early warning and typhoon signal bulletins, evacuation of affected residents, distribution of food and non-food items, and provision of medical assistance. In terms of pre-disaster preparedness, drills and exercises in schools and institutions are conducted but without regularity. For post-disaster activities, focus is on the reconstruction or rehabilitation of infrastructure damaged during the calamity.

With the recurrence of more devastating typhoons and the more frequent eruption of Mayon Volcano, which used to occur once in every ten year period but later became more frequent in intervals of three or five years, the provincial government was prompted to initiate better measures to cope with calamities. In 1989, with the support from the Italian government, the adoption of community-based disaster preparedness methodologies and responsive activities

to ultimately reduce the adverse effects of natural disasters was undertaken. Among the programs introduced, were as follows:

1. Institutional set-up and disaster management education,
2. Establishment of a disaster operations centre, installation of radio communication equipment, provision of rescue and relief facilities and the construction of embankments and evacuation facilities in 11 barangays; and
3. Launching of income generation projects for prospective volunteers to encourage their participation in disaster management strategies. (Romero, 2008: 6)

Prior to the adoption of such initiative, in 1987, the province suffered from severe damages caused by Typhoon Sisang where 600 people died due to drowning, with 395 injured and 153 recorded as missing. For infrastructure and crops, the damages accounted for over PhP 700 million. Again, in 1993, after having been devastated by Typhoon Sisang, the province experienced yet another disaster, the eruption of Mayon volcano. The voluminous pyroclastic materials spewed by the volcano claimed the lives of 77 people and caused the evacuation to safer grounds of about 63,000 individuals.. The provincial government and the people of Albay immediately realized that the casualties and losses could have been significantly higher were it not for the community-based disaster preparedness project initiated by the province. (Romero, 2008: 6-7) As shown by the following table, because of the early evacuation response initiated by the provincial government, the action resulted to zero casualty for several occurrences of typhoons and Mayon Volcano eruption. The year 2006, however, was an exception because of the high vulneratbility of the province given the onslaught of successive volcanic eruption and typhoons that were extremely devastating. Also refer to Annex A for a summary report on the disaster occurrences in the province as of June 2011. This report shows the devastation in the absence of disaster risk management prior to 1994.

**Table 1: Albay: Recent Disaster Risk, Response and Outcome**

Date	Disaster Risk	Response	Outcome
3-Nov-95	Typhoon Rosing	Early evacuation of 320,000 persons	No casualty
2-Nov-98	Typhoon Loleng	Early evacuation of 350,000 persons	No casualty
2000	Eruption of Mayon	Evacuation of 18,000 persons six hours prior to eruption	No casualty
2001	Eruption of Mayon	Evacuation of 20,000 persons in 10 hours	No casualty
2006	Eruption of Mayon	Evacuation of 39,432 persons from the permanent danger zone in two days	No casualty
September to December 2006	Typhoons Milenyo (27 September), Reming (30 November) and Seniang (14 December)	Typhoon Milenyo destroyed power and communication facilities. Attempts to evacuate people during Typhoon Reming were hampered by the breakdown of communication facilities. Continuous heavy rains triggered mudflows from the lahar deposits of Mayon.	655 fatalities. Estimated damage fo Php 7.8 billion

Source: Albay APSEMO

The Sangguniang Panlalawigan in 1994 supported the institutionalization of a disaster management office through the issuance of a Resolution for its creation. The support and endorsement of key government agencies paved the way for the establishment of a permanent disaster risk management office (DRMO) called the Albay Public Safety and Emergency Management Office (APSEMO).

The declaration of the International Decade for Natural Disaster Reduction (IDNR) Yokohama Message in 1994 was likewise contributory to the institutionalization of a permanent DRMO. IDNR has introduced a paradigm shift from disaster response to disaster risk reduction – that is, the realization that loss and damage from disasters can be prevented or minimized if people and governments are prepared, well-informed, and have the capacity to bounce back after a disaster strikes. (Romero, 2008: 8). This shift in paradigm is now captured in the framework for DRRM which is operationalized by the Provincial Government of Albay to prevent if not totally eradicate the loss of lives and properties among its constituents.

### **C. Albay’s Framework for Disaster Risk Reduction Management**

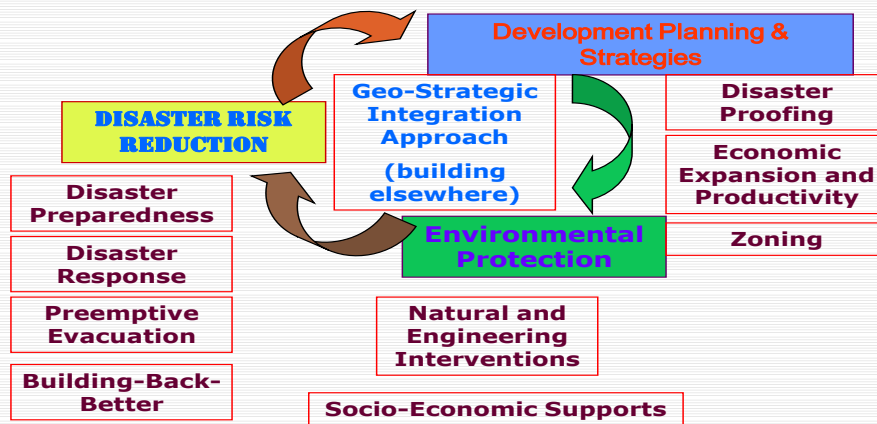
The new paradigm for disaster risk management is illustrated in Figure 6 showing the disaster risk reduction framework adopted by the province. Together with this framework, the following guiding principles are adopted to work towards reaching the goal of a safe development:

- To promote a proactive and not a reactive response to disasters,
- To evacuate at the early stage of the calamity instead of to rescue affected families,
- To promote an institutional rather than personal orientation,
- To promote coordination and team-work and not individual action,
- To conduct community-based disaster risk reduction programs and projects as basic input to the Regional Master Plan,
- To adopt a disaster proofing approach to development; and
- To integrate DRR in the Comprehensive Land Use Plan and promote no or selective investment in high risk zone, maximum protection in the low to moderate risk zone, and to identify safe zones as sites for new development investments.

Safe development for Albay is defined by (1) disaster proofing; (2) integrating climate change programs specifically adaptation and DRRM to achieve greater economic viability; and (3) acknowledging the potent effects of geologic, anthropogenic and climatic hazards which limit the attainment of millennium development goals and the human development index. (DRRM Plan, 2009:13)

## DISASTER RISK REDUCTION: A FRAMEWORK

DISASTER PROOFING DEVELOPMENT is central to Disaster Risk Reduction and Climate Adaptation



Source: Disaster Risk Reduction Management Plan, 2009

Figure 6: DRRM Framework for Albay Province

There are major elements identified in the framework to achieve safe development where the interplay and complementation of such elements are considered crucial. These elements are: (1) disaster risk reduction; (2) environmental protection; (3) development planning and strategies; and (4) geo-strategic integration approach.

### 1. Disaster Risk Reduction

This element adopts strategies such as disaster preparedness, disaster response, preemptive evacuation and building-back-better. *Disaster preparedness* is made operational in collaboration with primary warning agencies such as the PHIVOLCS and PAGASA along with the PDRRMC. This integrates capacity building such as emergency protocols and developing a community-based warning system. Risk mapping and emergency research are also important activities for disaster preparedness. *Disaster response* is conducted through information dissemination at the community level where information boards keeping updates on the impending calamity are maintained. It also includes a demand-driven relief operation, rescue and retrieval, and the management of disaster operation centres, among others. While it is undertaken at the post-disaster phase, damage and disaster assessment are also part of the disaster response strategy. *Pre-emptive evacuation* is the primary strategy to achieve the zero-casualty goal of the province. Evacuation is based on the gravity and proximity of risks and done at the declaration of Signal number 1 or 2 instead of Signal number 3. Evacuation protocols are also established and coordinated with key agencies such as the Office of Civil Defense and the local disaster coordinating council or task force. The *building-back-better* strategy incorporates relocation of settlements and the construction of better infrastructure that lessen the communities' vulnerability to disasters. (J. Salceda: 2008: 6,9).

## **2. *Environmental Protection***

The major strategies for this DRRM element include natural and engineering interventions and the socio-economic supports. Natural and engineering interventions require an integrated management approach of the fragile and more stable ecosystems within the concept of building-back-better approach after the occurrences of the past calamities. It calls for an extensive development efforts, investments and regulatory enforcements to improve the environment which is tantamount to developing the economic base from the ridges-to-reefs of the province. Included as one of the interventions is the Integrated Ecosystems Enhancement, Rehabilitation cum Protection Needs where strict enforcement of laws protecting the ecosystem and rehabilitation measures are the focus. Engineering intervention addresses the infrastructure requirements to prevent or mitigate the potential damages inflicted on the lives and properties of the Albayanos. (DRRM Plan, 2009: 78-79). The socio-economic support focuses on promoting the cultivation of culturally valued and traditional crops as sources of raw materials for income generating activities while doubling up as protection for the ecosystem and support to the sustainability of the environment. Development initiatives relating to agricultural development depend largely on environment enhancement aspect and also support the food security objectives of the province.

## **3. *Development Planning and Strategies***

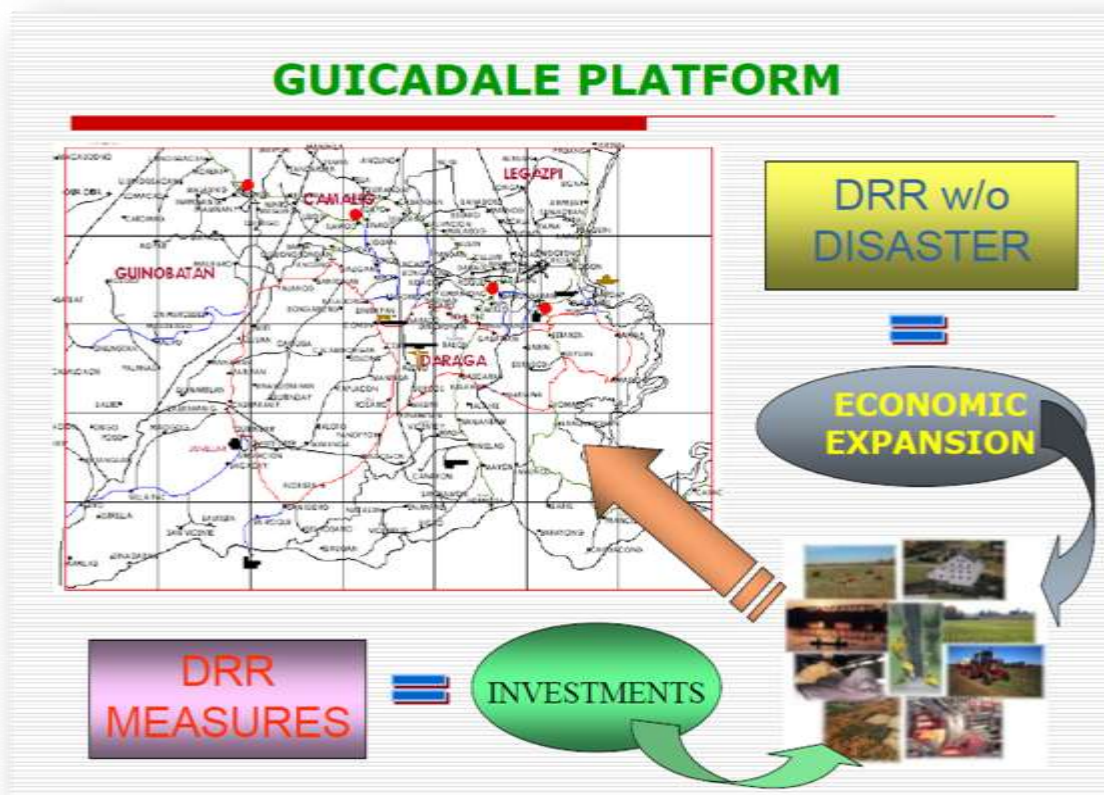
The integration of DRR in the development planning and strategies is adopted as an approach towards achieving a safe development. The application of disaster risk mapping as a tool in land use planning is useful to identify appropriate land uses and thereby determine investments both in economic and infrastructure development. Appropriate zoning for suitable land uses at the LGUs as integrated in risk mapping is advantageous for the (a) safety of the populations by avoiding the possible occurrences of catastrophes; (b) wise investment and resource utilization; and (c) identification of development constraints and opportunities.

In integrating DRR in economic development, the integrated ecosystems approach of analysis to determine the appropriate land uses and zones by spatial distribution is adopted. Plan preparation within this context, hence requires coordinative and pro-active participation of different expertise and disciplines from the concerned agencies. (DRRM Plan, 2009:17)

## **4. *Geo-strategic Integration Approach***

The principal geo-strategic intervention for disaster risk reduction is the GUICADALE Economic Platform (See Figure 7). GUICADALE stands for Guinobatan, Camalig, Daraga, and Legazpi City which are the three municipalities and one city that forms a contiguous upland area thereby creating a new suburban sprawl in the province. Primarily, the creation of the new economic platform aims to encourage economic activities to be located safe from the threats of the Mayon volcano eruptions, lahar flow, flooding, tsunami and thus be free from risks brought about by aforesaid disasters. The new economic platform is in a strategic upland location and while not entirely free from the effects of disasters it can be made viable for new investments. Other programs of the provincial government, like that of the Disaster Evaluation Analysis and

the Gradation of Landscapes, as discussed in the later chapter, support the effort to ensure a disaster-proof development.



Source: *Albay Disaster Risk Reduction Management Plan, 2009*

**Figure 7: The GUICADALE Economic Platform**

The critical components of the GUICADALE platform are the Southern Luzon International Airport, the Philippine National Railway South Central Station, resettlement sites for the families affected by the Mayon volcano eruption, the new regional centre, and a network of roads that would open access and connect the neighbouring towns within GUICADALE including the nearby towns of the Sorsogon province. (J. Salceda, 2008: 14)

What is significant in the DRMM framework is the integration of DRR in development and land use planning. Its mainstreaming in the CLUP is considered crucial in disaster management inasmuch as these plans, according to Gov. Salceda are the ‘*first line of defense against disaster*’. DRR mainstreaming as practiced in the province shall be further discussed in the succeeding subchapter.

**D. Mainstreaming DRR in Development and Land Use Planning: The Albay Experience**

The mainstreaming of DRR in development planning for Albay is geared towards attaining a safe and shared development goal. The province subscribes to the tenet that “*safe development + good governance = shared economic growth*”. (J. Salceda, 2008). To achieve the shared and safe development goal, the provincial government instituted some reforms in its

current system and formulated policies and strategies as embodied in the provincial plans. These policies and strategies are particularly responsive and facilitative of integrating DRR in development planning as well as in the programs and activities to be undertaken. Hence, mainstreaming DRR included institutional reformation, integration of DRR policies and strategies in development and land use planning, and the integration of DRR in development projects.

## **1. Institutional Reformation**

Institutional reformation has been undertaken to facilitate DRR integration in development and land use planning through the reconstitution of the Provincial Land Use Committee (PLUC). With the issuance of an Executive Order, new regular members comprised the Committee and these are the APSEMO, the Mines and Geosciences Bureau and the Philippine Institute of Volcanology and Seismology (PHIVOLCS). The primary task of PLUC is to assist the Sangguniang Panlalawigan in the review and approval of comprehensive land use plans formulated by the cities and municipalities within the province. These new members enhanced the capability of the committee to ensure the integration of disaster risk reduction and management in land use planning with their technical inputs particularly on hazards and risk assessment and mapping. (M. Pavia, 2011)

## ***2. DRR Policies and Strategies in the Development and Land Use Plan***

Mainstreaming DRR in development processes was the specific mandate of RA 10121 otherwise known as the Philippine Disaster Risk Reduction and Management Act of 2010. The Act provides that DRRM should be considered in policy formulation and socio-economic development planning, budgeting and governance. The integration is intended in the areas of environment, agriculture, water, energy, health, education, poverty reduction, land-use and urban planning, and public infrastructure and housing, among others.

The policies and strategies adopted by the province for the environment, agriculture, settlements, and infrastructure illustrate the influence of disaster hazards and risks in harnessing resources to promote quality of life and economic development together with protecting the environment.

### ***a. Environment Sector***

The protection of the environment from the effects of human activities and the protection of humans from the effects of the environment are both considered in planning. Within the context of disaster risk reduction planning and management, environmental factors are integrated in development processes to achieve the safe development goal aimed for by the province. Under land use planning, the environment sector is mainly addressed under the protection land use. This land use category includes portion of land and water set aside for its unique physical and biological significance, managed to enhance biological diversity and protected against human influence or impacts. Albay has been endowed with ecosystems featuring high level of biological diversity, and hence must be protected both from human activities and natural environmental

phenomena like disasters. The categories of protection land applicable to the province are the National Integrated Protected Areas System (NIPAS), Non-NIPAS, and the areas subject to severe erosion.

Primarily, the objective under this sector is to redirect the growth of the province outside of the protection lands and the highly restricted agricultural lands. However, the non-demarcation of boundaries of these protection lands remains to be addressed. The policies and strategies proposed under the current Provincial Development and Physical Framework Plan (PDPFP) include the delineation and demarcation of the permanent boundary line of the protected area as well as the different management zone. These areas are to be restored through the implementation of sustainable developmental projects and the strict enforcement of regulations of protected areas under the NIPAS Law and extensive rehabilitation of the denuded areas and watershed forest reserve.

#### *b. Agriculture and Other Production Areas*

*Agriculture remains to be the backbone of the provincial economy.* Under the regional development plan (Bicol RDP 2008-2010), an intensified agricultural production is seen as a development driver where the province is considered a major player having the most percentage of irrigated agricultural land. Within the context of DRRM, these resources have to be protected from calamities and the risks to be mitigated.

This sector adopts policies and strategies that promote technologies to prevent soil erosion within alienable and disposal lands with slope of 30 to 50 percent. Total rehabilitation and development of production forests, watershed and ecotourism areas are addressed as well to lessen the impacts of exposure to calamities. Land suitability, environmental impacts and support infrastructure for establishing agri-industrial centers and economic zones are included as policy to promote production activities that can be disaster-proof. Also included is the policy on environmental mitigation or activities intended to develop the forests, mangroves, coral reefs, water impounding and service facilities, soil erosion control facilities, wind breaks and the like that contributes to minimize the adverse impacts of severe weather and hazardous climatic and volcanic events on the people and the economy of the province. (PDPFP, 2011-2016: 119-120)

#### *c. Settlements*

The settlements sector is highly vulnerable to the impacts of disaster and the continuous expansion of urban centres may increase its vulnerability without any direction for growth. Thus, the objective in developing this sector is to promote settlement growth in areas safe from the risks and hazards of disasters. The policies and strategies for this sector provide for strict implementation of the “No Human Activity Area” within the six-kilometer permanent danger zone along the slopes of Mayon Volcano. Supportive of this is the policy to strengthen disaster management awareness among the populace and the disaster management operations of LGUs to effectively respond to natural and man-made calamities occurring in the province. Sites for socialized housing in compliance with the Urban Development and Housing Act (RA 7279) and safe zone areas for expansion and development for investments shall be identified. Permanent resettlement areas and facilities for families in the danger zones and in high risk areas like

flooding, erosion, sink holes, and those lying along active fault lines shall be established. Evacuation and not rescue shall be the primary concern of the province in case of disasters.

*d. Infrastructure*

Disaster risk reduction measures involve investments on infrastructure facilities to prevent/mitigate the potential damages that may be inflicted on the lives and properties of the Albayanos. These infrastructure facilities include: river dike, sabo dam facility construction, vengineering measures, slope protection, sea walls, dredging, rechannelization, and urban drainage. These engineering interventions play a critical role in DRR as these reduces the vulnerability of the communities affected by the disasters. To put emphasis on the role of infrastructure in safe development, policies and strategies on this sector focus on the consideration of the risk factors relative to natural hazards in the installation/construction of infrastructure facilities. These facilities and utilities shall be upgraded upon being subjected to an appropriate study indicating the economic viability, social desirability and environmental impact assessment. The design of infrastructures shall be based on agency design and shall conform to the National Building Code. (PDPFP, 2011-2016: 132)

**3. Integration of DRR in Development Projects**

Aside from the specific policies and strategies governing the various sectors, the planners and decision-makers of the province formulated a set of guidelines for the location of projects. A gradation of landscapes has been developed primarily to categorize the development units in the province and thus promote more suitable investments considering the constraints or limitations posed by the geophysical character of the area. Inasmuch as projects are the translation of the plans for development, its feasibility and contribution to the safe development goal of the province is very important and thus require more thorough examination of the factors contributory to the success of project implementation.

*a. The Gradation of Landscapes for Locating Development Projects*

This approach to project evaluation adopts the principle that each landscape offers varying grades of capabilities to host development activities while in same manner offers constraints to development investments. The gradation scheme represents the hazards for each category of landscape or development units as shown in the table below. The areas with the least constraints are assigned a grade of 1 which represents the lowlands without hazards. As the grade increase, up to level 9, the hazards present in the areas also increases and may be designated for restricted uses such as those considered as protected areas.

**Table 2: Gradation of Landscape for Locating Projects/Investments**

Landscape/Development Units	Developmental Grade
Lowland with no hazards	1
Upland with no hazards	2

Lowland with hazards	3
Upland with hazards	4
ECA lowlands under reservation	5
ECA uplands under reservation	6
ECA lowlands with hazards and under reservation	7
ECA uplands with hazards and under reservation	8
Coastal areas and municipal waters	9

Note: ECA stands for Environmentally Constrained Areas

There are five general principles to be observed in locating structures and other projects across the different types of landscapes as shown above, and these are:

- i. The higher the grade, the lesser investments shall be made to involve permanent infrastructure;
- ii. The higher the grade, the more that development shall focus on more easily “rehabilitatable” investments, addressing incomes and livelihoods and mitigating environmental risks. Among these are investments that improve vegetative cover (e.g., forest plantations and plantations of high-value crops) or stabilize slopes (e.g., terrace farming);
- iii. The higher the grade, the denser shall be the investments on innovative value-adding (e.g., educational tours on natural hazards; hazards’ tourism);
- iv. The higher the grade, the lower shall be the density and intensity of heavy industries; i.e., the higher the grade, the less heavy the industries to be introduced (such as high-value crops, poultry, pasture; and hog-raising); and
- v. The higher the grade, the denser shall be the investments on nature-enhancement (e.g., on biodiversity). (PDPFP, 2011-2016: 21-22)

Applying this scheme of grading land use to identify and differentiate development activities across the different landscapes (or development units) is a basic approach to attaining ‘Disaster Proofing Development’ of the province.

#### *b. Disaster Evaluation and Analysis*

Other undertakings of the province together with its partners further support the geo-strategic intervention strategy. In partnership with the Bicol University, a new consortium has been forged to identify and analyze disaster risks for existing and proposed projects in Albay either for private business or for public infrastructure. This further enhances the integration of DRR into development planning as such would aim to reduce the risks while targeting increased business returns, minimize waste of resources and enhance economic welfare.

The Institute for Disaster Evaluation and Analysis (formerly Center for Disaster Evaluation and Analysis) adopts the following location-specific indicators in the evaluation of existing and proposed projects:

- Is the location within the danger zone?
- Is it sensitive to hydro-meteorological risks like rising temperature?
- Is the location threatened by lahar?

- Is it landslide prone?
- Is it flood-prone?, and
- Is it at risk to storm surge or sea level rise.

In considering these indicators, the main focus of the analysis is on the impact of the environmental factor on the project. The approach is a reverse of the Environmental Impact Analysis where the assessment puts weight on the impact of the project on the environment. Results of the analysis and evaluation will lead to the issuance of a certification by the APSEMO based on the summary of the disaster risk profile of the project. It will also serve as input in the preparation of the Annual Investment Plan and the Physical Framework Plan for the province. (J. Salceda, 2010)

The province's accomplishment in the integration of DRR is considerably significant. Despite being the *Vatican of disasters*, as the present Governor calls the province, the safe development that it aims for can be made possible with the policies and strategies in place supported by establishing a responsive system through institutional developments as discussed in the succeeding chapter.

## **E. Creating and Mobilizing a Responsive System: The Provincial Government and Its Partners**

### ***1. Institutional Creations Within the Provincial Government***

With the shift from disaster response to disaster risk management, the province has introduced corresponding changes in its institutional set up. Foremost of this is the creation of a permanent disaster management office called the APSEMO as mentioned in earlier chapters. Two other project offices have been established to complement the functions of the APSEMO and to also respond to the demands of the other phases in disaster risk management. The Centre for Initiatives and Research on Climate Adaptation (CIRCA) and the Albay Millennium Development Goals Office (ADMGO) are the newly created program offices to reinforce the capability of the provincial government.

#### ***a. The Albay Public Safety and Emergency Management Office (APSEMO)***

APSEMO was officially established in 1994 and became a regular department of the provincial government. Upon its creation it set out to delineate the roles of PDCC members and volunteers before, during and after the impact of the calamity; it enhanced communication linkages within the organization and within the sectors involved in public safety as anchored on disaster preparedness, mitigation, response and recovery, and maintained active coordination between and among the local government units, government organizations, non-government organizations and Provincial Disaster Coordinating Council (PDCC) member agencies to ensure timely and appropriate action on disaster related activities. (Romero; 2008: 15-20).

This office has a four-fold task, namely; (1) disaster preparedness, (2) disaster response operations; (3) recovery; and (4) public safety and administrative functions. The task on disaster preparedness includes the conduct of risk and hazard assessment based on the information

obtained from PAGASA and PHIVOLCS. Mapping and documentation of specific disaster risk areas are also prepared and used as basis for the disaster operations. For the disaster response operations, APSEMO manages and coordinates provincial-level disaster response activities at the onset of a disaster risk equivalent to Typhoon Signal No. 2. Together with PDRRMC, it executes the disaster and emergency response plans to alleviate the crisis, manage communication and information and monitor the disaster situation as well as the overall response. For the recovery function, it conducts a comprehensive damage assessment and the formulation of a multi-sector rehabilitation plan. APSEMO communicates the rehabilitation plan and secures funding from local and international organization. For public safety and administrative functions, activities include peace and order, traffic safety, certification of danger zones and hazard areas, DRM education, training and other technical assistance, and support to research.

APSEMO faces a daunting task given the frequency of calamities in the province. However, since its creation, the department has notably gained credits for the accomplishments in the area of disaster risk management. It has contributed to the formulation of the provincial and regional strategic development plans and provided inputs to legislated disaster-related policies and programs in mitigation and preparation, relief and rehabilitation. Through its efforts the local disaster management capacity was enhanced and created higher awareness on DRR. Along this line, the City and Municipal Emergency Response Intervention Teams (C/MERITS) for 5 municipalities and 2 cities were also created.

Other accomplishments of APSEMO are the development and standardization of an operations manual on the different phases of disaster adopted by the PDRRMC and the implementation of the Community Based Disaster Risk Management Pilot Program in selected municipality which will enhance the CLUP and development plan as well as implement the communication and warning system. The effectiveness of this office in coordinating the disaster risk management of the government, service providers and vulnerable constituents of the communities contributed to minimized loss of life, property and livelihood. (*Bicol RDP, 2008 – 2010*). The table below attests to the effectiveness of the APSEMO in the implementation of the zero casualty objective where from 1994 to 2010 there was indeed zero casualty during major disasters except for the year 2006.

**Table 3: Major Disaster Events in Albay Province, 1994 - 2010**

Major Disaster Events in Albay Province 1994-2010: Zero Casualty in 16 years except 2006				
Calamities	Date	Classification	Casualty	Damage Cost
1. Typhoon Rosing	Nov. 3, 1995	Destructive	ZERO	P 1.7 B
2. Typhoon Loleng	Nov. 2, 1008	Destructive	ZERO	7.1 B
3. Mayon Eruption	Feb. 2000	Explosive	ZERO	284 M
4. Mayon Eruption	June 2001	Explosive	ZERO	300 M
5. Mayon Eruption	July 2006	Explosive	ZERO	50.5 M
6. Typhoon Milenyo	Sept. 27 2006	Destructive	14 dead	1.3 B
7. Typhoon Reming	Nov. 30, 2006	Destructive	604 dead 419 missing	3.7 B
8. Typhoon Mina, Lando and Nonoy	Nov. 2007	Destructive	ZERO	
9. TECF, Monsoon Rains	Feb. 2008	Destructive	ZERO	127 M
10. Typhoon Dante	April 2009	Destructive	ZERO	
11. Typhoon Ondoy	Sep. 2009	Destructive	ZERO	
12. Typhoon Peping	Oct. 2009	Destructive	ZERO	
13. Mayon Eruption	Dec. 14, 2009 - Jan. 2, 2010	Explosive	ZERO	

Source: CIRCA, Province of Albay

**Table 4 Historical data on Typhoon, Number of Casualties and Cost of Damages to Agriculture and Infrastructure, Province of Albay, 2006 – 2011**

Name of Calamity	Date(YEAR/M DATE)	Provinces Affected	Casualties				Evacuation		Damage				
			Dead	Injured	Missing	Rescued	Families	Persons	Houses		Agriculture	Infrastructure	Total
									Partially	Totally			
<i>Typhoon Milenyo</i>	2006, Sep 27	Albay(18mun;660 bar.)	28	29	0		116,410	698,460	91,865	21,477	1,279,597,132.50	385,719,000	1,665,316,132.50
<i>Typhoon Reming</i>	2006, Dec 7	Albay(18 muni;653 bar.)	608	1,394	605		6,674	31,085	78,272	96,879	545,221,462	569,194,897	1,114,416,359.00
<i>Typhoon Mina</i>	2007, Nov 23- Dec 14	Albay (18 Mun;272 Brgy)					33,694	163,256			8,744,466.76		8,744,466.76
<i>Low Pressure Area</i>	2008, Feb 18		22	10	5		12,786	30,709			58,626,254.57		58,626,254.57
<i>Typhoon Frank</i>	2008, June 18-23	Albay											-
<i>Tropical Storm Ondoy</i>	2009, Sept 24-27	Albay									9,515,241.28		9,515,241.28
<i>Typhoon Peping</i>	2009, Sept 30-Oct 3	Albay					5,845	27,530			94,975,968.67	117,200,000.00	212,175,968.67
<i>Typhoon Santi</i>	2009, Oct 28 - Nov 11		12	6			2,500	13,224			11,839,285.63	126,360 M	11,839,285.63
<i>Typhoon Basyang</i>	2010, July 12-14		21		23	88	193	1,002			17,232,324.34	70,187,500.00	87,419,824.34
<i>TECF</i>	2010, Dec 22		6		10	91	13,733	64,312			544,280,521.59	972,917,500.00	1,517,198,021.59
<i>Tropical Storm Bebeang</i>	2011, May 6-18		27	5	2	8	7,395	38,191			796,749,099.69	1,167,536,990.00	1,964,286,089.69
<i>Typhoon Chedeng</i>	2011, May 21-27						61,433	281,819				70,611,100.00	70,611,100.00
<i>Tropical Storm Falcon</i>	2011, June 21-25				8	6	8,949	43,122			31,146,550.50	30,800,000.00	61,946,550.50

Annex B also shows a historical record on the occurrences of Mayon volcano eruptions and the damages to lives and properties. Significant to note is the reduction in casualties over the

years, as shown in Table 3, as the preventive programs of the province have been adopted such as the early warning system and the preemptive evacuation.

*b. The Centre for Initiatives and Research on Climate Adaptation (CIRCA )*

This project office was established in 2007 as a consortium with the Bicol University (BU), the World Agroforestry Center (WAC), the Environmental Management Bureau, the University of the Philippines, Los Baños (UPLB) and the Provincial Government of Albay. Primarily, the objective of CIRCA is *to enhance the coping* abilities of Albay residents to the threats brought about by the changing climate and to specifically develop the environmental awareness of the various livelihood sectors of the province. Its main focus is to promote climate risk adaptation and its mainstreaming in the educational programs of the various academic institutions in the province.

The local policies and programs of the province as implemented by CIRCA include the A2C2 or the Albay in Action on Climate Change and disaster risk reduction which work toward promoting a climate-proofing and disaster-proofing development. These are supported by strategies implemented at present to avoid climate related disasters. Lead programs include the clean-up of rivers and creeks to avoid flooding when heavy precipitation occurs during typhoon or just on ordinary rainy season. Another program focuses on the CRABS or the Cagraray, Rapu-Rapu, Batan and San Miguel which are the major islands of the province. Eco-tourism is promoted in these areas while aiming for sustainable development.

Currently, CIRCA created a partnership with the Philippine National Oil Company (PNOC), LGU of Manito, and DENR to reforest mangrove plantations in the coastal municipalities of the province. This program, as well as the other programs undertaken by the office is its contribution to the disaster and climate-proof development goal of the province. ([www.albaycirca.org](http://www.albaycirca.org))

*c. The Albay Millennium Development Goals Office ( AMDGO)*

ADMGO is another project office set up within the province to respond to the rehabilitation and recovery phase in DRRM. It sprung from a task force called the *Ayuda Albay*, created under the leadership of then Governor Fernando Gonzales, to coordinate the relief operations after the onslaught of typhoon Reming in 2006. *Ayuda Albay* was scaled up to become a task unit of the PDCC and it became the Albay Mabuhay Task Force which performed an oversight function in the delivery of relief services using the cluster approach. In 2009, the task force underwent another transformation and was institutionalized into a program office now called the AMDGO. Its primary function includes managing the social assets program of the province, oversees the millennium development goals (MDG) implementation and coordinates the MDG programs with the government agencies and other partners. (Sasakawa Award Nomination Submission; 2011)

While the APSEMO coordinates disaster response efforts, the AMDGO coordinates disaster recovery efforts through a cluster approach. This cluster approach was first adopted by the *Ayuda Albay* and was since then the approach applied in disaster relief and recovery

programs. From seven clusters, two others have been added and are now being implemented by the AMDGO. In this approach the different member organizations are organized into sectors or clusters representing their specific areas of concern. There are nine clusters identified and these are: 1) Water, Health, Sanitation and Nutrition, (2) Education and Children, (3) Tourism and Environment, (4) Food Security, Livelihood and Economic Opportunities, (5) Protection, (6) Shelter, Housing and Relocation, and (7) Logistics; (8) Evacuation and Transit Camp management, and (9) Geostrategic Integrations. The cluster approach adopted by the province was also later supported by the United Nations as an approach to disaster management. (J. Salceda, 2008)

## **2. The Key National Government Agencies and their DRR Initiatives**

The Provincial Government of Albay subscribes to the principle of “*Coordination and team-work and not individual action*”. With that in operation, it sets to work with the key government agencies at the province to achieve its DRR objectives. Reflected in this discussion is not a complete enumeration of the activities undertaken by all the agencies in the province but rather includes those where there are current projects in collaboration with the provincial government.

- a. *Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), the Philippine Institute of Volcanology and Seismology (PHIVOLCS).*

Currently, the PDRRMC, through the APSEMO, maintains close coordination with the primary warning agencies which are the PAG-ASA and PHIVOLCS. Reports from these two agencies set into motion the response actions such as the conduct of pre-emptive evacuation of affected communities. PHIVOLCS issues monitoring reports on volcanic and other seismic activities to issue warning for communities particularly those lying within the slope of the volcano in case of eruptions and those coastal areas that may be affected by rising sea level during typhoons or tsunamis.

It is recognized, however, that the capabilities of these institutions are still inadequate to provide adequate forecasts. PAGASA can provide relatively accurate wind forecasts but not for rainfall. PHIVOLCS has mapped the active faults and volcanic hazard maps but these are still macro maps that has to be further scaled up to lot or parcel level to accurately identify population at risk. These front line agencies have the technical capability for disaster response but lack equipment on early warning, weather forecasting and earthquake monitoring. (Updated RDP, 2008-2010).

In 2008, a customized seismic hazard simulation software called the Rapid Earthquake Damage Assessment System (REDAS) has been created in partnership with PHIVOLCS. Through the application of this technology, the province conducted risk assessments and produced hazard and risk maps associated with earthquake. Although the REDAS software was designed for rapid seismic hazard evaluation after the occurrence of a potentially-damaging earthquake, various hazard maps such as pyroclastic flow, lava flow, lahars, ashfall and tsunamis were built in the REDAS database. Future plans include incorporating the hydrometeorological hazards prepared by the MGB into the software. (PHIVOLCS-DOST, 2008).

The determination of earthquake-induced hazards and its potential damages to lives and properties guided the decision-makers in crafting disaster preparedness schemes. The application of REDAS in the preparation of CLUP provided basis for land use regulation and even in the enforcement of the building code. To further support the CLUP preparation, REDAS training has been conducted by PHIVOLCS to enhance the capability of the LGUs. (PHIVOLCS-DOST, 2008)

b. *Mines and Geosciences Bureau, Department of Environment and Natural Resources( MGB-DENR)*

The MGB provided most of the geohazard mapping needs of the province. It has completed maps on landslide, flood and ground subsidence for about 60 percent of the municipalities and cities in the region. These geohazard maps of the MGB as integrated into the development and physical plan of the province help establish the planning environment with the geophysical constraints and limitations to consider. DRRM strategies have been likewise made more responsive as the hazards affecting the province have been identified and mapped out. (J. Salceda, 2008)

c. *Bureau of Soils and Water Management, Department of Agriculture*

A soil analysis is being undertaken by the BSWM for the province where at present it has already completed the soil testing for two cities and one municipality. This activity is supportive of the strategy to reduce the vulnerability of the agriculture sector to disasters by promoting the most compatible uses for agricultural lands as determined by the soil testing activity of the Bureau. (J. Salceda, 2008)

### **3. The Local Government Units and their DRRM**

As mandated by RA 10121, the LGUs are to create the corresponding local Disaster Risk Reduction and Management Councils (DRRMCs) to address the disaster management concerns in their areas. These local bodies shall have the responsibility *to ensure the integration of disaster risk reduction (DRR) and climate change adaptation (CCA) into local development plans, programs and budgets as a strategy in sustainable development and poverty reduction.* They are to build resilient communities and institutionalize DRR in their functions and operations.

At present, the LGUs are being required by the National Economic and Development Authority (NEDA) to integrate DRR and CCA in their local development planning particularly in the preparation of their respective CLUPs. It is recognized that DRR and CCA are local concerns that can be effectively addressed by capacitating the LGUs to formulate their action plans and implement the same. In Albay, the LGUs are assisted by the Provincial Planning and Development Office (PPDO) by providing them the technical assistance and reviewing the final plan. Most of the cities and municipalities are currently finalizing their plans and working towards its formal adoption through their respective Sanggunian.

Aside from establishing their local DRRMO, LGUs are urged to institutionalize disaster risk reduction within their functions and operations and to develop the knowledge, capacity and system to enable their compliance to mandates of RA 10121. As far as creating local DRRMO, according to Dir. Daep of APSEMO there is one municipality, Sto. Domingo, that passed a resolution for the creation of their DRRMO. Other municipalities are still in the process of organizing their DRRMO and assistance is provided by APSEMO (Daep, 2011). The state of organizing the local DRRMOs to respond to the totality of disaster risk reduction management is influenced by the extent of their experience on disaster management and on the political will of the incumbent executives to mainstream DRR in their plans, programs and activities.

#### ***4. The Academe and the Diocesan Social Action Arm in DRRM***

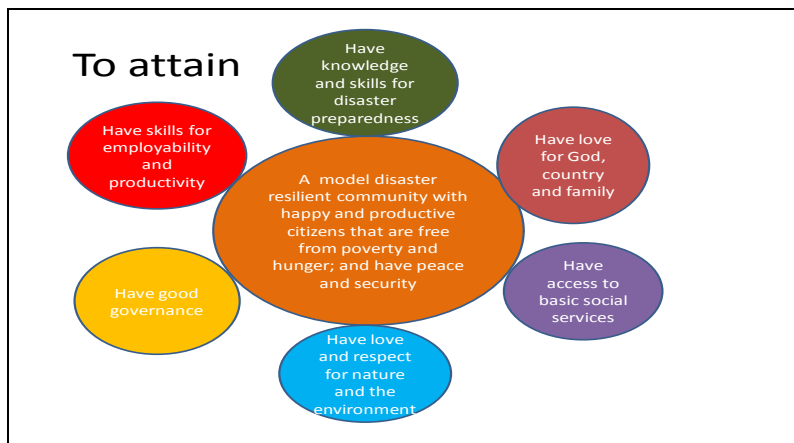
Partnership with other government agencies and non-government organizations (NGOs) is key to the accomplishments of the province in DRRM. The academe, particularly the Bicol University, played a crucial role in educating the communities through the research and extension services it provided. It was one of the principal institutions which created the CIRCA to respond to the climate change adaptation and the DRR mainstreaming in the operations and functions of the provincial government.

The NGOs' contribution to the accomplishments of the province in disaster management is not without merit. Activities of NGOs complemented the efforts of the provincial government and through them the much needed additional manpower and funds to implement the plans and programs down to the barangay level are supplemented.

The contributions of two of the partners of the province are included in this report to gain insights on their DRRM programs and to learn the lessons drawn from their experience. Bicol University as the prime educational institution in the province is recognized for the programs it has implemented and continues to implement at the community level as well as the technical assistance it provides to the province. Social Action Center of the Diocese of Legazpi, is a local non-government organization, that has actively supported not only the relief operations but also disaster preparedness programs. It continues to provide assistance to communities at the barangay level particularly in capacitating them towards a more effective DRRM.

##### *a. The Bicol University.*

In response to the call for participation of stakeholders, the University became one of the primary movers in mainstreaming DRR and CCA in the school curricula. A review of curricula resulted to the creation of new courses in the graduate program and integrating DRRM to subjects in the undergraduate courses. The university also embarked on other programs that significantly contributed to building disaster resilient communities. It refocused on extension services and adopted the theme "Educating to Build Resilient Communities". This was operationalized through BU's flagship program "BU Global Actions" which aims to develop and showcase models of disaster resilient communities to attain holistic and sustainable development. The objectives of establishing a disaster resilient community is illustrated in the diagram below:



Source: BU Extension Service Center, 2011.

**Figure 8: Objectives for Establishing Disaster Resilient Community Models**

One convergence model is the Conservation Farming Village (Sagip Saka) implemented in three barangays of Ligao City spearheaded by the College of Agriculture and Forestry through funding from PCARRD-DOST and NEDA. This project promotes the Sloping Land Management Systems to protect the uplands and increase its productivity through sustainable agricultural farming practices. The promotion of this farming technology addresses flooding and soil erosion that cause more damage to their sources of livelihood especially during typhoons and rainy seasons.

Another model for disaster resilient community implemented by BU is the Science and Technology Based Farm Model with the assistance of the Techno Gabay Program of PCARRD showcasing climate change adaptive technologies. This model addresses rehabilitation after a calamity and the basis for selecting model area is the varying agro-ecological zones. Other models developed addressed nutrition improvement finetuned to complement the goal to achieve a disaster resilient community as this focused on improving resiliency of the human resource. The University also developed a model for resettlement/relocation site which integrated the promotion of physical fitness and health to create a balanced development with the premise that healthy and physically fit human resource enhances resiliency.

The choice of communities to host the various models is based on its vulnerability to hazards as determined by its location, natural features and landscape. The ecosystem approach is also applied as a factor for selection. Upland communities are considered most vulnerable to disasters and calamities as such vulnerability is likely to affect the lowland and coastal communities. The replication of the models considers the physically challenged or environmentally critical areas. (Pavilando, 2011).

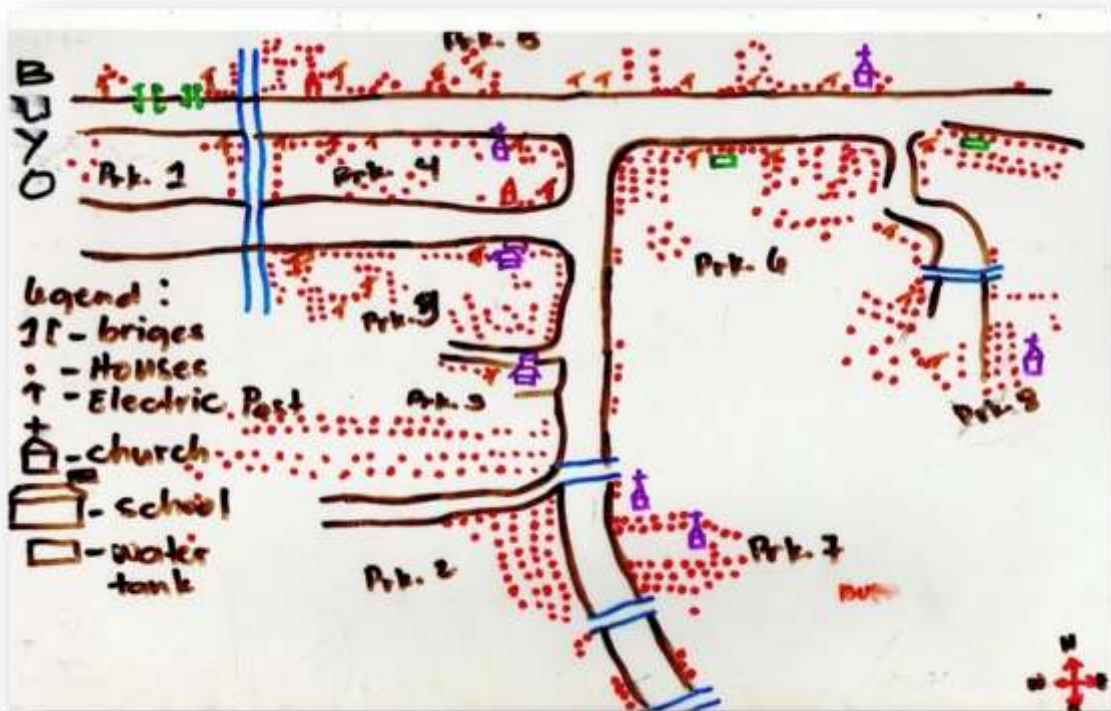
In addition to building disaster resilient community models, the University also had its recent partnership with CIRCA, EMB, MGB, PHIVOLCS and PAGASA to establish a new consortium called the Institute for Disaster Evaluation and Analysis (IDEA) as mentioned in previous chapter. In this new partnership, BU provides the technical expertise and its academic resources in evaluating the projects to determine the impacts of disasters that will affect the feasibility of such projects.

*b. The Social Action Center, Diocese of Legazpi*

This non-government organization is the social action arm of the Diocese of Legazpi created in 1972 and as in its nature, has been involved with relief operations each time a calamity strikes the province. After years of distributing relief aid to the victims of calamities, SAC saw the inadequacy of a one-time assistance and the people's inability to cope with disasters. It was then that the institution engaged in disaster rehabilitation initially through livelihood programs to provision of disaster mitigation kits such as rain gauges, capacity building for disaster preparedness and on to provision of temporary and permanent shelter for the displaced families. (Segubiense, 2011). Relief operations, however, has never been taken out of its functions but rather brought to a higher level with its involvement in the provincial task force called the Ayuda Albay as one of its prime movers for the disaster relief and recovery efforts. It was in Ayuda Albay task force that the cluster approach to disaster management has been formulated and which was later supported by the United Nations. (SAC, 2007).

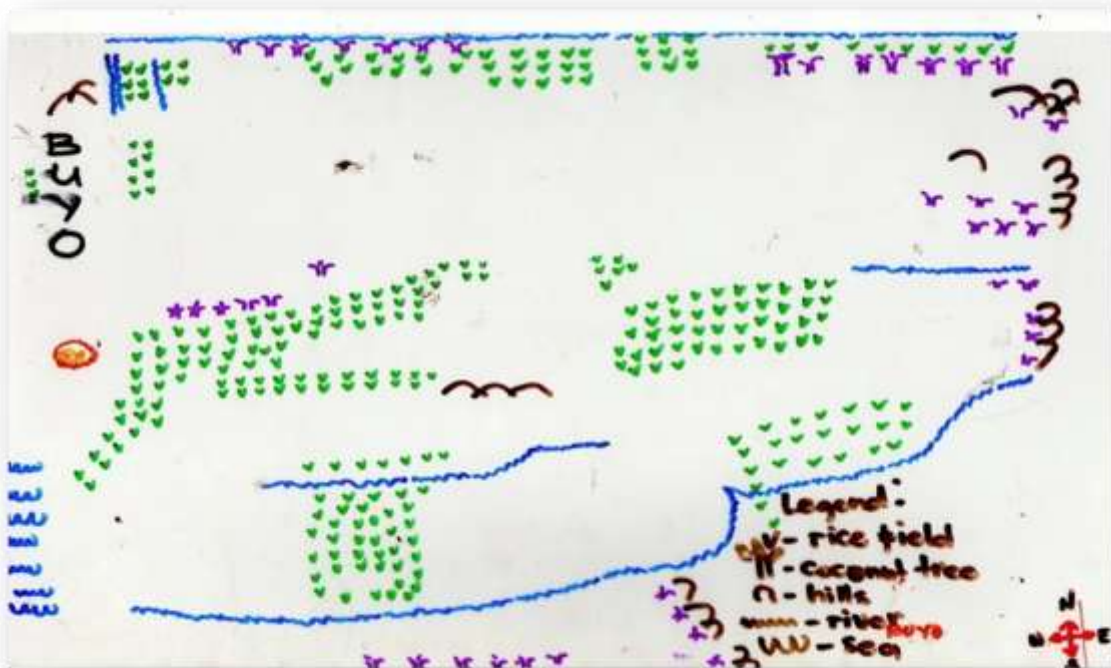
SAC has a Disaster Management Program comprised of livelihood and resettlement projects for typhoon *Reming* victims, including the regular project on community risk assessments, early warning systems, capacity building with livelihood complement, crop guarantee system, and disaster management education. (Abejuro, 2008). A current component of the Disaster Management Program is the conduct of a *Participatory Hazards, Capacities and Vulnerabilities Assessment* for selected barangays in the municipalities of Manito and Bacacay. These are two of the most hazard-prone areas in the province as these are coastal municipalities. Significant to note in this activity is the participation of key persons in the barangay in the identification of risks and hazards in their locality and that the result of their assessments serve as inputs to the Barangay Development Plan. Results of the workshops include a (1) historical timeline where the participants are made to recall the calamities that affected their barangay for the recent past and its effects on their community; (2) resource map; (3) risk graph and matrix; (4) social maps, hazard maps and risk maps; and (5) venn diagram and organizational matrix. The risk map resulted from overlaying the resource and social maps and the identified hazards in the area. (SAC, 2011). While the outputs may be crude in its form, what has been achieved is important as this assessment served as an awareness building for the communities where they have analyzed their situations within the context of disaster risk management. Also notable in this program is the documentation of the history of hazards, as shown in the historical timeline, that occurred in their barangays and the impacts to their lives and property. Shown below are samples of the outputs of the workshops conducted in the barangays.

This activity conducted by SAC among the selected barangays is an intervention that is significant in enriching the skills and knowledge thus building the capacity of the community in DRRM. With this enrichment the people are expected to become more involved in DRRM related activities in their barangay.



Source: *Participatory Hazards, Capacities and Vulnerabilities Assessment for Manito, 2011*. Albay: Social Action Center, Diocese of Legazpi.

**Figure 9: Social Map of Barangay Buyo, Manito, Albay**



Source: *Participatory Hazards, Capacities and Vulnerabilities Assessment for Manito, 2011*. Albay: Social Action Center, Diocese of Legazpi.

**Figure 10: Resource Map of Barangay Buyo, Manito, Albay**



Source: *Participatory Hazards, Capacities and Vulnerabilities Assessment for Manito, 2011*. Albay: Social Action Center, Diocese of Legazpi.

**Figure 11: Hazard Map of Barangay Buyo, Manito, Albay**

**Table 4: Sample Risk Matrix for Barangay Buyo, Manito, Albay**

Hazard	Probability	Consequence	HVC Summary	Risk Interpretation
Landslide	Possible	Disastrous	HVc	High Risk
Sheet Flood	Certain	Minor	HVc	Low Risk
Flash Flood	Possible	Disastrous	HVc	High Risk
Storm Surge	Unlikely	Minor	HvC	Low Risk
Tsunami	Unlikely	Minor	HvC	Low Risk
Typhoon Signal #3	Certain	Moderate	HVC/Hvc	Medium Risk
Typhoon Signal #4	Certain	Major	HVC/Hvc	Medium Risk
Storm Wind	Certain	Minor	Hvc/HVC	Medium
Fire	Unlikely	Minor	Hvc	Low Risk
Destructive Earthquake	Unlikely	Minor	HvC	Low Risk

Note: HVC – hazards, vulnerabilities, capacities

Source: *Participatory Hazards, Capacities and Vulnerabilities Assessment for Manito, 2011*. Albay: Social Action Center, Diocese of Legazpi.

### III. LEARNING THE LESSONS FROM THE ALBAY EXPERIENCE

#### A. Analysis of the Existing Institutional Arrangements

The Provincial Government of Albay recognized the need for reorganization and even the creation of new bodies to address the challenges of a disaster-prone geography. Essential to cope with the paradigm shift from disaster-response to disaster risk management is the creation of the

institutions to enhance the capacity of the local government to reduce the vulnerability of the entire province.

Foremost in the institutional developments undertaken is the creation of the APSEMO as a permanent disaster risk management office. Its inclusion in the PLUC together with MGB and PHIVOLCS further enhanced the province's capacity to respond to the demands of DRM and to integrate its concerns in development planning.

APSEMO's institutionalization resulted to improvements in disaster preparedness, disaster response, mitigation and recovery/rehabilitation. In the study conducted under the auspices of Oxfam, following are some of the benefits derived from institutionalizing the DRMO:

- 1. The mitigation and preparedness programs conducted by APSEMO reduced the number of fatalities, injuries, and destruction to property caused by disasters. With pre-emptive evacuation as a strategy, the zero-casualty objective of the province has been attained in several instances. As earlier shown in Table 1, the province's response to disaster risk resulted to favourable outcomes such as the zero and reduced casualty of the disasters that occurs in Albay.*
- 2. The conduct of information, communication, education, organization and mobilization programs improves the communities' sense of security and confidence. It enhanced the level of capacity of the local communities to help themselves and inspire the development of community-based early warning systems.*
- 3. The importance of DRR initiatives and how it contributes to the local development plans has been reinforced. The continuance of APSEMO illustrates the importance of a coherent and complementary executive-legislative agenda with the LGU.*
- 4. The establishment of APSEMO can further clarify the authority, responsibility, accountability, roles and resources between local government departments and officials involved in disaster risk management, social welfare and development, public safety, emergency management, transportation and communication, infrastructure and highways, and planning and development. It could also enhance the working relationship of the LGU with national government agencies involved in disaster risk management.*
- 5. The APSEMO can enhance the capacity of LGUs to prepare for disasters through research, education and information, and early warning system.*
- 6. The APSEMO analyzes, evaluates and improves disaster management policies, strategies, processes, tools and practices within the LGU. Knowledge management is enhanced through the creation of a disaster manual that standardizes procedures, techniques and processes before, during and after a disaster strikes.*
- 7. A permanent DRMO ensures continuity and incremental improvement in disaster risk management. It leads to the establishment of parallel structures that complement the DRMO's role. (Romero, 2008:22-24 )*

With an institution like the APSEMO that is focused on disaster risk management, the provincial government of Albay was able to consolidate disaster-related functions previously under the various departments. As a coordinating body it was able to improve the response mechanism to disasters most evident of which is the pre-emptive evacuation scheme that is now being implemented. The complementation of functions of the PPDO, the CIRCA and the AMDGO, enhanced disaster mitigation and preparedness especially with an increased awareness and participation of the local communities in the DRM activities. According to Gov. Salceda, investments in disaster preparedness mean lower response cost. This is why the province is beefing up its capacity in disaster preparedness and has sought assistance of the government agencies and non-government entities to increase the capacity of the local government.

These institutions at the provincial level have already created a working mechanism that complements the functions of each organization involved in DRRM. However, a replication of this coordinating mechanism and enhancement of the capabilities of the municipal and barangay DRMOs still require attention. Many of the municipalities and barangays have not yet established an operational DRMO.

Going out of the sphere of the government institutions, there are other key players in the accomplishments of the province in DRM. The role of the local and international non-government organizations, people's organizations and educational institutions are not to go unrecognized. The complementary functions of these entities were evident in their presence at the local communities particularly at the barangay level where their activities focused on enabling the people to increase their resiliency to disasters and thus recover from the onslaught of typhoons or the lava flow from Mayon Volcano or from the floods or landslides brought by torrential rains. Important among the achievements of these entities are the increased awareness on disaster preparedness and mitigation especially the identification of the hazards and risks affecting their local communities.

In general, adjustments in the structure, functions and programs of the institutions involved have improved the DRRM approach. The previously response-oriented system levelled-up to address the entire phases of disaster management.

## **B. Success Factors and Constraints of the Existing System**

### **1. Success Factors**

#### *a. Political Will*

The accomplishment of Albay in DRMM is recognized as a result of sustained initiatives that emanated from previous leadership. Since 1994 to date, the previous efforts of local executives have been pursued and continued. This can be seen from the creation of APSEMO in 1994 which was supported throughout the terms of the successors in office. This is an indication that this agenda is not driven by politics but rather there is a recognition that the problem goes beyond politics. It is not bound by their term of office but rather by the desire to create a safe and livable community for their constituents. With the present Governor himself as the champion for DRRM, the display of political will set things in motion from the creation of institutions to appropriation of budget and even to being hands-on and directly supervising the

DRRM program. The efforts of Gov. Salceda have been recognized both locally and internationally and such recognition also paved the way to access to technical assistance made available by many funding donors.

*b. Partnership with Local and International Organizations*

Another success factor for Albay is the partnership it has forged with local and international organizations. It entered into partnership with the government agencies like the MGB, EMB, PHIVOLCS, and PAGASA to conduct hazards and risk assessment and thus set the planning environment with the constraint and limitations posed by such factors. The Manila Observatory also provided assistance to the province and has also produced hazard maps used by the province. Other local institutions that supported the DRRM programs are the Bicol University and the University of the Philippines, Los Banos. These prime educational institutions supported the research and education component of DRRM. The Spanish Agency for International Cooperation and Development (AECID) and the Oxfam Great Britain were also two of those international organizations that supported the disaster response phase primarily through IEC. Without these partners, the resources of the provincial government would not be sufficient for all the programs and activities it has laid down for DRRM.

*c. Institutionalization of DRMO*

As earlier discussed in this paper, the creation of APSEMO as a regular department of the provincial government ushered in an improved capacity to undertake disaster risk reduction management. With an independent office for DRRM, the efforts were focused and became more responsive to the challenges caused by the many hazards that beset the province. This pioneering work has become one of the best practices recognized nationwide and the learnings from this achievement is shared to other LGUs in the country. Furthermore, the permanent nature of the office helped sustain DRRM programs as it was supported by regular budget allocations as well as funding assistance from funding organizations.

*d. Legislative Enactments for DRRM*

The passage of RA 10121 or the Disaster Risk Reduction and Management Act of 2010, although considered belated in the case of the province as it started efforts on DRRM prior to its becoming a national law and that the experience of Albay served as input to its legislation, supports the DRRM efforts of the province by laying down the legal basis for its actions. The enabling mechanism embodied in the law such as the creation of local DRMMOs provided the mandate to all LGUs, in support of the Local Government Code, to proceed with its institutionalization and this was also the objective of the APSEMO. *The strengthening of the capacity of LGUS together with partner stakeholders to build resilient communities and to institutionalize arrangements and measures for reducing disaster risks, including projected climate risks, and enhancing disaster preparedness and response capabilities at all levels* is likewise given emphasis in said law; (RA 10121, Sec. 2 (e)). The objectives of the province find support in the declared policy of the law on *mainstreaming of DRR and climate change in development processes such as policy formulation, socioeconomic development planning, budgeting, and governance particularly in the areas of environment, agriculture, water, energy,*

*health, education, poverty reduction, land-use and urban planning, and public infrastructure and housing, among others. (RA 10121, Sec. 2 (g)).*

The RA 9729 or the Climate Change Act of 2009 also provides the legal framework, in consonance with the DRRM strategy of the province, *to adopt the strategic goals in order to build national and local resilience to climate change-related disasters.* This law supports and recognizes disaster risk reduction as one of the issues in relation to climate change. The Act provides guidance to CIRCA, as organized in the province to pursue climate change adaptation initiatives and integrate the same in the DRRM.

With these two laws providing the legal basis, the province is fully capacitated to pursue DRRM with support in terms of fund allocation and resources being made available by the key government agencies and in partnership with the international and local NGOs working for the same objectives.

## ***2. Constraints in the Existing System***

### ***a. Lack of Capacity at the City/Municipality and Barangay Level***

The institutional set-up and the level of capacity and DRR integration attained at the provincial level is yet to cascade to the cities/municipalities and barangays. In their updated RDP, NEDA has noted that most of the LGUs activities related to disaster risk reduction border on *disaster response with very little disaster preparedness and post-disaster activities.* While there are efforts for capacity building and in some areas emergency response teams called the C-MERITS and local DRRMCs have been organized, there is yet a need to integrate the whole system of DRRM into the regular operations and performance of functions at the lower level of governance. DRM should not remain as an ad hoc activity but rather a regular function given the disaster-prone condition of Albay.

At the barangay level, the Barangay Disaster Coordinating Council is unstable it being reorganized every election. The Council is convened only when there is an impending disaster. (Abejuro, 2008). With such condition of organization the performance of functions can be expectedly hampered.

### ***B. Identification of Hazards and Risks with the Application of Small Scale Maps***

Hazards and risks assessment is a local problem. The closer to the ground, the more effective would be the strategies to address the negative impacts and to lessen the vulnerability of the communities. At present, most of the hazards and risk assessments and mapping conducted at the provincial level apply small scale mapping. What is required, particularly for use by the barangays, is a large scale map to provide the details required for disaster risk assessment and planning.

### ***c. Improvements Required for the Early Warning System***

PDRRMC and APSEMO rely on the weather forecasts and warnings issued by PAGASA and PHIVOLCS. In the RDP, however, the issue on modernization or upgrading of instruments

in these two agencies are recognized as a need to issue fast and accurate information relied upon by the province to undertake pre-emptive evacuation of affected communities. To equip these agencies would not respond only in times of disaster response but also in disaster preparedness, mitigation and recovery.

The improvements in the system is not required only at the provincial level but more so at the barangay level. While the APSEMO has provided early warning facilities and equipment such as SIM-pack for communication, bicycles for mobility, and rain gauge, among others, this assistance has to be sustained and monitored to ensure that these are used for the purpose. Early warning skills enhancement should be included in the package of assistance.

### **C. Recommended Agenda for Action**

Albay has already achieved unparalleled accomplishments in the field of DRRM. Its success is being replicated in other parts of the country and international acclaim has been bestowed in recognition of the innovative programs and actions that made the Albay DRRM a model for other LGUs. The province, however, may still benefit from the following recommended points for action to realize the safe development goal it aims to achieve:

#### **1. Sustain partnership with NGOs and other institutions**

Partnership with other GAs and NGOs is one of the factors that contributed to the success of DRRM at the provincial level. To achieve the same at the city/municipality and barangay level, continued and sustained partnership is likewise required inasmuch as this entails greater manpower and resource requirement considering the number of LGUs to be assisted. To rely on the resources of the provincial government alone will take the process of DRRM integration in the regular operations and functions longer than what can be achieved with the assistance of other organizations.

#### **2. Establish operational local DRRMOs using Community Organizing as a Strategy**

APSEMO has reported on the organized emergency response teams and the local DCCs it has organized at the LGUs. These organizations, however, are activated only during calamities. Integration of DRRM calls for regular and permanent set-ups as proven by the creation of APSEMO. To accomplish this, community organizing can be used as a strategy for the communities to ensure more local participation and to develop ownership over the programs and strategies formulated. As in some cases at the barangay level, the organized DCCs were not operational and that the key officials identified as members are not fully aware of their functions. It is also in this aspect that the partnership with NGOs particularly those whose strength is on community organizing will be beneficial for the provincial government.

#### **3. Conduct hazards and risks assessments at the barangay level**

Hazards and risks are local problems and responding to such would require working closer with the barangay DRMOs. Mapping hazards and risks at this level will yield more details valuable to planners and decision-makers such as identifying engineering interventions to

reduce the risks to the communities. A scientific approach combined with the actual observations of the residents or a locality at risk can improve the accuracy of risk assessment. While this assessment has already been started by NGOs, only a few barangays are being covered. Given the importance of hazards and risk assessment for DRR planning, this activity must be given full support and attention.

To complement the assessment at the barangay level would be a documentation of the history of disasters and the hazards and risks that affected the communities. Regular monitoring of the conditions of the barangays especially those within the high risk areas has to be incorporated in the functions of local DRRMCs.

#### **4. Adopt a Bottom-Up approach in DRRM planning**

A planning approach that would proceed from the barangay to the provincial level for purposes of DRRM planning will be more appropriate as it is recognized that disaster is a localized concern. More responsive policies and strategies can be formulated and more responsive programs and plans can be generated to combat the challenge of constant flooding, landslides, volcanic eruption and other hazards which often create havoc on the lives and properties of the communities in the province. DRRM planning requires details and no broad-stroke strategies. It can better be achieved when planning is undertaken at the barangay levels. This would require enhanced capacity of the local leaders and decision makers to achieve a plan truly reflective of the actual condition and needs of the locality. With a highly participative and localized planning, the people's awareness and commitment to DRRM can also be established and sustained.

#### **5. Create Empowered Communities**

Increased public awareness and public participation is key to an efficient DRRM system. The local people are directly affected by the problems on disasters and they suffer its consequences. To empower them and to improve areas for cooperation can benefit them and the whole community. Organizations in the local level should be fully capacitated since their presence in the community enable them to provide immediate actions. The integration of local knowledge and local culture may further enhance the disaster response and preparedness mechanism.

#### **6. Conduct Cost-Benefit Analysis (CBA)**

A cost-benefit analysis finds its application in disaster risk management particularly in evaluating programs and strategies for intervention. The province had initial efforts to study the cost and benefits derived from relief operations and on the impacts of intervention on the agriculture sector. (APSEMO). This economic tool can be adopted to determine the viability of investments in infrastructure, public projects and other interventions directed towards enhancing individual capacity to cope with the impacts of disasters such as education and psychosocial programs. Aspects to be considered in the CBA may also include the preventive interventions such as the early-warning strategies and preventive evacuation, relocation of affected families, as well as the programs addressing climate change adaptation and environment sustainability. The establishment of a community-based disaster risk management might as well be subjected to

CBA particularly with the application of technologies to address disaster risk reduction and prevention.

#### ***7. Adopt a standard DRRM Manual to guide the LGUs***

A standard DRRM manual providing a guide for activities from disaster preparedness, mitigation, response and recovery will benefit the LGUs and would complement the capability programs made available to those personnel involved. Integration of DRRM plans and strategies from barangays to city/municipality and on to the next higher level will be facilitated by adopting a standard approach or procedure. The identification of hazard-prone and high-risk areas can also be facilitated by establishing standard parameters.

### **IV. CONCLUSION**

Albay is the Vatican of Disasters as the present Governor, Joey Salceda, refers to the province. Its vulnerability to disaster related hazards is primarily influenced by its location and geographic landscape – that of being situated along the Pacific Ring of Fire that causes a more active Mayon Volcano and being an island the lies along the Western Pacific Basin which is a generator of climatic conditions. Despite its vulnerability, the province adapted measures to overcome the constraints and limitations posed by such in its development. The institutionalization of a permanent DRMO enabled it to address the other aspects of DRRM particularly the planning aspect where its mainstreaming into the development and land use plans of the province and the LGUs became major strategy. With APSEMO focused on DRRM, the province was able to initiate capacity building at the municipal/city and barangay level and thus lessen their vulnerability to the hazards within their own locality. Its permanent nature likewise made possible the sustained operation of DRRM programs inasmuch as the regular budget support and funding assistance generated from outside sources helped in implementing the objectives of the province.

Institutional reformation and creation to undertake the tasks under the DRRM framework formulated by the province contributed to developing a more responsive governance and system within the province. CIRCA and AMDGO complemented the functions of APSEMO to create a more holistic approach to DRRM that focuses not only on disaster response but puts equal weight on disaster preparedness, mitigation, and recovery. The reconstitution of PLUC is also evident of the recognition that the existing configuration has to be enhanced to make it DRRM responsive and thus added were member agencies with strengths in disaster hazards and risks assessment.

The political will, partnership and legislative enactments are all success factors to be considered. Without the interplay of all these factors, the province will not achieve its pioneering work in the province and be able to share its lesson to other LGUs in the country.

On top of all the institutional initiatives, disaster awareness of the communities has been improved through training and information campaign. While community participation remains

to be worked out, the new knowledge imparted to the communities can expectedly result to better community participation. As all efforts in development start with the people, their awareness and participation are must ingredients to achieve the desired state.

Albay has proven that geography and environmental phenomena should not hinder development. Man can choose to overcome and conquer the challenge. More work awaits the province before it realizes its safe development goal. But what is important is the fact that first steps has been taken. Together with its partners, Albay will rise above the challenge of disasters and achieve a stronger economy free from the impacts of typhoons, volcanic eruptions and other calamities that are constants in its existence.

**Annex A: Summary Report: Disaster Occurrences in the Province of Albay (As of June 2011).**

Type of Major Disaster	Year	Affected Population				Total Damages (Php)
		Persons	Dead	Injured	Missing	
						Houses, Infrastructure, Agriculture
Mayon Volcano eruption	1993	63,066	77	10	0	72,723,083.55
Typhoon Akang	1994	18,036	47	112	1	99,535,687.00
Typhoon Gading	1994	6,799	1	2	1	69,598,965.00
Typhoon Mameng	1995	10,126	0	0	0	71,499.797.00
Typhoon Rosing	1995	440,372	0	20	2	1,700,000,000.00
Typhoon Pining	1997	1,800	0	0	0	37,663,000.00
Typhoon Loleng	1998	201,834	0	7	1	7,100,000,000.00
Typhoon Sendang	1999	1,122	0	0	0	110,000.00
Mayon Volcano eruption	2000	68,626	0	0	0	284,076,061.22
Mayon Volcano eruption	2001	46,914	0	0	0	300,000,000.00
Typhoon Dindo	2004	33,892	0	6	1	226,712,081.00
Typhoon Unding	2004	1,744	0	0	0	42,394,231.31
Typhoon Yoyong	2004	18,372	0	10	1	50,590,299.30
Active Low Pressure - ITCZ	2005	19,062	4	0	0	139,499,254.00
Tropical Storm Caloy	2006	47,065	0	5	0	99,346,841.00
Mayon Volcano eruption	2006	40,451	0	0	0	50,590,299.30
Typhoon Milenyo	2006	698,460	14	176	0	1,665,316,132.50
Typhoon Reming	2006	1,060,875	604	1,465	419	3,230,435,702.00
Typhoon Mina	2007	214,734	0	0	0	22,800,000.00 (agri/coconut)
TECF 2008	2008	83,327	5	0	0	304,206,287.70
Typhoon Frank	2008	138,937	0	0	0	21,789,000.00 (agri/coconut/livestock)
Typhoon Dante	2009	49,712	0	0	0	238,316,148.00
Typhoon Peping	2009	89,926	0	0	0	9,000,719.00
Typhoon Santi	2009	671,314	0	0	0	6,510,000.00
Mayon Volcano Eruption	2009	47,563	0	0	0	16,659,000.00
TECF 2011	2010	48,419	3	0	0	734,748,829.34 (as of 2/3/11)
TS Bebang	May 8, 2011	96,243	6	0	1	595,343,014.63
TS Chedeng	May 25,	221,094	0	0	0	5,710,768.00

	2011					
TS Falcon	June 22, 2011	107,253	0	0	1	46,762,630.00
TS Juaning	July 22, 2011	765,365	16	23	0	1,779,757,593.13

Source: LGUs, DPWH, DAR, NIA, PSWDO, DOH, PHO, PEO, PAS, PVS, PCA

**Annex B: CHRONOLOGIES OF HISTORICAL ERUPTIONS OF MAYON VOLCANO, Eruption Character, Affected Areas, and 1616 - 2006**

<b>Year/Duration</b>	<b>Eruption Character</b>	<b>Affected Areas/Remarks</b>
1616 Feb. 19 – 24	explosive, pyroclastic flow, lava flow, lahar	
1766 July 20 – 24 (Oct.20 - 25)	Vulcanian, lava flow, pyroclastic flows, bombs, ashfall; 10-15 m eruption column  (Lahar)	Pyroclastic and lava flows towards east (July 20-27); (Malinao destroyed, major damages to Cagsaua, Guinobatan, Budiao, Polangui, Ligao (Oct.) CASUALTIES: 39)
1800 Oct 30 – 31	Vulcanian, lava flow, pyroclastic flows, bombs, ashfall	Cagsaua, Budiao
1811 Oct.5 – 6	Vulcanian, lava flow, pyroclastic flows, bombs, ashfall	
1814 Feb. 01	Plinian, pyroclastic flows, volcanic lightning, lahar,bomb	Camalig, Cagsaua, Budiao, Guinobatan, half of Albay CASUALTIES: 1200; MOST DESTRUCTIVE ERUPTION
1827 June 27 – 1828 Feb.	Vulcanian, pyroclastic flows, bombs, lava flows; 300 m high eruption column	Camalig (lahar)
1834 – 1835 May	Vulcanian, pyroclastic flows, ashfall, lahars, bombs	
1839	Minor ash eruption	
1845 Jan. 21	Vulcanian, ashfall, lava flow (15-30 minutes eruption)	Camalig, Guinobatan, Ligao (ashfall)
1846 May 11	Vulcanian, pyroclastic flows, ashfall, lahar	Camalig (12 cm thick ash)
1851 May 26 – June	Minor ash eruption	
1853 July 7	Vulcanian, ashfall, pyroclastic flow, lahar	Camalig, Guinobatan, Ligao, Oas, Polangui, Malilipot, Bacacay, Albay, Cagsaua CASUALTIES: 34
1855 Mar. 22	Minor eruption with incandescent ash and Pele's hair, explosive, lava flow	
1857	Probably ash eruption	
1858 Jan.	Strombolian, lava flow, lahar; initial lava fountaining lasted until December	With casualties
1859 – 1860		
1861	Minor ash eruption	
1862	Minor ash eruption, lahar	
1868 Dec.17	Vulcanian, pyroclastic flows, lahar, bomb, volcanic lightning	
1871 Dec. 8 – 1872 Jan	Vulcanian, ashfall, bombs, pyroclastic flows	Albay, Legazpi, Camalig, Guinobatan; Ashfall on the SW CASUALTIES: 3
1872 Sept. 5 – 9		
1873 June 20	Minor ash eruption	
1876 Nov. 26	Minor ash eruption	
1881 July 6 – 1882 Aug	Strombolian, ashfall, lava, pyroclastic flow, lahar (crateral outburst started 21 Nov. 1881)	Camalig and Guinobatan
1885 Nov. 21	Lava flow	
1886 July 8 – 1887 Mar.	Strombolian, ashfall, lava and lahar	Camalig and Guinobatan
1888 Dec. 15	Minor ash eruption	
1890 Sept. 10	Vulcanian-Strombolian, ashcloud, lava flow	Libog (lava flow)
1892 Feb. 3	Vulcanian, ashfall, pyroclastic flow, bombs, volcanic lightning	Libog and Camalig
1893 Oct. 4 – 31	Minor ash, lapilli and bomb	Eastern slopes (lava flow)

	eruption, lava flow, lahar	
1895 July 7 – Nov. 26	Ashfall, lava flow, lahar, volcanic lightning	
1896 Aug. 31 – Sept. 27	Minor ash and lava eruption	
1897 June 4 – July 23	Vulcanian (strong), tephra fall, pyroclastic flow, lava flow, lahar, volcanic lightning	DUE TO PYROCLASTIC FLOWS: seashore of Sto. Domingo and barrios of Sto. Nino, San Isidro, San Roque, San Antonio, Misericordia (all in Sto. Domingo), Ligao, parts of Bigaa, San Fernando and Legazpi; DUE TO LAVA FLOW: Basud River (Sto. Domingo), ENE, Camalig  CASUALTIES: 350 (most likely due to pyroclastic flows) Next to 1814 eruption in destructiveness; violent phase lasted 17 hours
1900 Mar. 1 - 6	Vulcanian, ashfall, pyroclastic flows, lava flow, lahar	DUE TO LAVA FLOWS: Legazpi and Libog, ASHFALL: Ligao, Guinobatan, Tabaco, Libog and Camalig
1902	Minor ash eruption, with lahar (probably due to 1900 deposits)	
1928 Jan.	Vulcanian, pyroclastic flow, lava flow, ashfall	San Antonio & Malilipot (pyroclastic flows), San Antonio, Tabaco, Amtic, Ligao (ashfall); Libog (lava flow)
1938 June 5	Vulcanian, ashfall, pyroclastic flow, lava flow	Foothill barrios of Legazpi and Sto. Domingo; DUE TO ASHFALL: Guinobatan, Ligao, Camalig, Daraga and Tabaco; DUE TO LAVA FLOWS: Sto. Domingo
1939 Aug. 21	Minor explosion, ashfall	
1941 Sept. 13	Minor ash/steam eruption	
1943	Minor ash/steam eruption	
1947 Jan. 8 – Feb.	Vulcanian, ashfall, lava flow, pyroclastic flow	DUE TO LAVA FLOW: Sto. Domingo, Calbayaog, Malilipot; DUE TO PYROCLASTIC FLOW: San Vicente, Malilipot; DUE TO ASHFALL: Masarawag, Guinobatan (ankle-deep ash)
1968 Apr. 20 – May 20	Vulcanian, ashfall, pyroclastic flow, lava flow; eruption column of as high as 10 km	DUE TO PYROCLASTIC FLOW: Tinobran, Quirangay, Miisi, Bonga; DUE TO LAVA FLOW: Camalig; DUE TO ASHFALL: Camalig, Guinobatan and Legazpi
1978 May 3 – July	Strombolian, ashfall, lava flow (lava emission lasted until July 4)	Camalig (ashfall)
1984 Sept. 9 – Oct.	Strombolian-Vulcanian, ashfall, pyroclastic flow, lava flow, lahar, 1.7-16 km eruption column	DUE TO PYROCLASTIC FLOW: southeast and east of Mayon, Bonga, Sto. Domingo; DUE TO LAVA FLOW: Camalig; DUE TO ASHFALL: Sto. Domingo, parts of Legazpi
1993 Feb. 2 – Apr. 4	Vulcanian-Strombolian, pyroclastic flow, lava flow, lahar, 1-5 km eruption column	DUE TO PYROCLASTIC FLOW: Mabinit, Bonga; DUE TO ASHFALL: Camalig, Sto. Domingo, Legazpi; LAVA FLOW AND LAHAR WERE CONFINED TO GULLIES; CASUALTIES: 77 dead, 5 injured
2000 Feb. 24 - March 1	Strombolian-Vulcanian, pyroclastic flow, lava flow, ashfall, 0.5-17 km high eruption column	DUE TO ASHFALL: Guinobatan, Ligao and part of Camalig; LAVA FLOWS AND PYROCLASTIC FLOWS WERE CONFINED TO GULLIES
2001 June 1-22 2001 June 23 –24 2001 July 26	Mild eruption, quiet effusion of lava (lava flow) Strombolian-Vulcanian, lava fountaining, pyroclastic flow, 10 km high eruption column	
2003 Jan. 31, March 17, April 05, May 06 & 14	Series of ash explosions; 0.4-1.5 km high column; Intermittent faint crater glow	PRECURSOR TO 2006 ACTIVITY
2004 June 03, July 22	Ash explosions; not visually observed due to cloud cover; recorded as explosion type earthquake; 22 July event accompanied by rumbling sound	Traces of ash deposits observed at Bgy. Baligang, Amtic and Tambo (Ligao, NW side of Mayon)  PRECURSOR TO 2006 ACTIVITY

Source: Disaster Risk Assessment Report, Province of Albay.

## REFERENCES:

Abejuro, John B. "Crafting Institutional Policies in Managing Disaster Risks of a Changing Climate. An Exploratory Study to Review the Policies and Practices of Social Action Center, Diocese Of Legazpi, and the Micro-Finance Subsidiary, Simbag Sa Pag-Asenso, Inc., on Disaster Management in the Province Of Albay". Social Action Center, Diocese of Legazpi Province Of Albay, Philippines. December 2008.

Albay (Philippines); <http://www.microdis-eu.be/content/albay-philippines>. Accessed May 2011.

Interview with Dr. Cedric Daep. Executive Director; Albay Public Safety and Emergency Management Office; Albay Provincial Government. May 2011.

Interview with Engr. Macario Pavia; Provincial Planning and Development Officer. Albay Provincial Government. May 2011.

Interview with Dr. Lani Pavilando; Director, BU Extension Service Center; July 2011.

Interview with Fr. Ramoncito Segubiense. Executive Director; Social Action Center, Diocese of Legaspi. May 2011.

National Economic and Development Authority. Region 5. Updated Regional Development Plan. 2008-2010.

Philippine Institute of Volcanology and Seismology. "PHIVOLCS Provides REDAS Software and Trainings to Local Government Units"; December 2009.  
([http://www.phivolcs.dost.gov.ph/index.php?option=com\\_content&view=article&id=267:phivolcs-provides-redas-software-andtrainings-to-local-government-units-&catid=54:news&Itemid=26](http://www.phivolcs.dost.gov.ph/index.php?option=com_content&view=article&id=267:phivolcs-provides-redas-software-andtrainings-to-local-government-units-&catid=54:news&Itemid=26))

Province of Albay. *Provincial Development and Physical Framework Plan, 2011-2016*.

Province of Albay. *Disaster Risk Reduction Management Plan*. 2009.

Republic Act No. 10121. "An Act Strengthening the Philippine Disaster Risk Reduction and Management System, Providing For the National Disaster Risk Reduction and Management Framework and Institutionalizing the National Disaster Risk Reduction and Management Plan"; 2007.  
[http://www.ndcc.gov.ph/index.php?option=com\\_content&view=article&id=45:republic-act-no-10121&catid=17:ndrrmc-issuances&Itemid=19](http://www.ndcc.gov.ph/index.php?option=com_content&view=article&id=45:republic-act-no-10121&catid=17:ndrrmc-issuances&Itemid=19)

Republic Act No. 9729. "An Act Mainstreaming Climate Change into Government Policy Formulations, Establishing the Framework Strategy and Program on Climate Change, Creating For This Purpose the Climate Change Commission, And For Other Purposes". 2009.  
<http://www.chanrobles.com/republicacts/republicactno9729.php>

Romero, Segundo E. “A Permanent Disaster Risk Management Office: Visible, Measurable Impact over the Years. Albay Provincial Government.” *Building Resilient Communities: Good Practices in Disaster Risk Management.*, Oxfam Great Britain. 2008.

Salceda, Joey S. [2008]. “Scaling Up Resources for Disaster Risk Reduction: The Practices of Albay Province, Philippines”. Third Asian Ministerial Conference on Disaster Risk Reduction; Kuala Lumpur. December 2-4, 2008.

(<http://www.unescap.org/idd/events/AMCDRR-2008/documents/TS4-Philippines.pdf>)

Salceda, Joey S. [2010]; “Development Climate Change Policy: Adaptation Practices of Albay to Outperform MDG by 2015”; Roundtable on Local Governance and Climate Change-Delivering on the Ground. Asia-Pacific Climate Change Adaptation Forum; 22 October 2010.

([http://www.asiapacificadapt.net/adaptationforum2010/static/downloads/AdaptationPracticesOfAlbayToOutperformMDGby2015\\_JoeySalceda.pdf](http://www.asiapacificadapt.net/adaptationforum2010/static/downloads/AdaptationPracticesOfAlbayToOutperformMDGby2015_JoeySalceda.pdf))

Social Action Center, Diocese of Legazpi. [2007] “Disaster Management in Albay: A Documentation Research on the Response of Ayuda Albay and SAC-Legazpi to the Short and Long Term Effects of Typhoon Reming in Albay Province”. December.

Social Action Center, Diocese of Legazpi. “Participatory Hazards, Capacities and Vulnerabilities Assessment for Manito, 2011.”

The Green Economist. “Disaster Risk Analysis Unit to be Launched by Apsemo-Bicol University”. June 7, 2010.

(<http://joeyssalceda.wordpress.com/2010/06/07/disaster-risk-analysis-unit-to-be-launched-by-apsemo-bicol-university/>)

UNISDR: “Documentation of the Work by the Albay Governor, Joey Sarte Salceda Against the 10-Point Check List” Sasakawa Award Nomination Submission; Feb. 2011.

([http://unisdr-apps.net/.../Documentation on Albay +Gov for+Sasakawa+Award.doc](http://unisdr-apps.net/.../Documentation%20on%20Albay%20+Gov%20for%20Sasakawa%20Award.doc))