



PROVINCIAL DISASTER RISK MANAGEMENT PLAN

PROVINCE OF LA UNION



2010-2015

PROVINCIAL DISASTER RISK MANAGEMENT PLAN, 2010-2015
Province of La Union

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Impact	Adverse Effects
<p><u>Higher Temperatures</u></p> <p>Heat-trapping gases emitted by power plants, automobiles, deforestation and other sources are warming up the planet.</p> <p>The five hottest years on record have all occurred since 1997 and the 10 hottest since 1990, including the warmest year on record – 2005.</p>	<p><u>Agriculture Sector</u></p> <ul style="list-style-type: none"> • Drought • Floods <p><u>Forestry Sector</u></p> <ul style="list-style-type: none"> • Forest fires • Wildlife migration <p><u>Coastal Sector</u></p> <ul style="list-style-type: none"> • Sea-level rise • Coral bleaching <p><u>Health Sector</u></p> <ul style="list-style-type: none"> • Heat/water-related deaths/ illnesses

Sea Level Rise

Sea levels rise because warmer water takes up more room than colder water, a process known as thermal expansion.

Melting glaciers compound the problem by dumping even more fresh water into the oceans.

Increased Risk of Drought, Fire, Floods

Climate change is intensifying the circulation of water on, above and below the surface of the Earth — causing drought and floods to be more frequent, severe and widespread.

Coastal Sector

- Inundation of low-lying areas
- Coastal/shoreline erosion
- Property damage
- Ecosystems destruction (mangroves, wetlands)

Water Sector

- Saltwater intrusion (Salinization)

Forestry Sector

- Forest fires
- Threatened biodiversity
- Productivity of Forest Products

Economic Losses

Climate change is affecting businesses and economies at home and around the world. If action is not taken to curb global carbon emissions, climate change could cost between 5 and 20 percent of the annual global gross domestic product, according to a British Government report

Agriculture Sector

- Food shortage
- Water supply shortage

Health Sector

- Heat/water-related deaths/ illnesses

Agri-Fishery Sector

- Heat-related marine resources depletion/fish kill
- Declining crop yields

Coastal Sector

- Relocation of displaced coastal communities
- Rehabilitation of coastal infra

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1. INTRODUCTION

The management of risks is one of the great challenges of the 21st century. Experiences on major disasters have demonstrated the adverse impacts of the phenomena to the economic development of a country. The disasters divert the energies and resources away from planned growth and development. Natural and technological disasters often cause substantial damage to life and property, infrastructures, cultural heritage, and the ecological basis of life.

Indeed, the Philippines is one of the most natural hazard-prone countries in the world. Its exposure and vulnerability to natural disasters is immensely increasing due to continuing population growth, change in land use and sea patterns, uncontrolled migration, unplanned urbanization, unabated environmental degradation and the threat of global climate change.. Allowing dense populations on a floodplain or permitting poor or unenforced building codes in earthquake zones is as likely as a natural event to cause human and property casualties and losses. Similarly, allowing the degradation of natural resources increases the risk of a disaster. Consequently, Region I is highly prone to natural disasters. Strong typhoons, floods, coastal erosion, landslides and earthquakes were recurrent phenomena in the region.

On 26 September, Typhoon Ondoy (International name Ketsana) made landfall in the Philippines causing at least 300 deaths and some two million people to be displaced. Over a week after the passage of Typhoon Ondoy, large areas of Metro Manila and nearby provinces remained flooded with waist-high stagnant water, leading to risks of outbreaks of waterborne diseases and health hazards from overflowing solid waste and garbage that had filled drains and mixed with the waterways. Typhoon Pepeng (International name Parma) followed on 3 October, devastating the agricultural sector and affecting more than 300,000 people. The damage caused by the two storms is estimated at Php 208 billion pesos in property and infrastructure, as well as monumental damage to agricultural production. The recent Typhoon “Pepeng” has many lessons to offer which require local governments to redirect their efforts in designing effective management systems for disasters.

Intense storms and floods and long-lasting droughts can erode existing coping capacity of communities to prepare, respond and rebuild after successive hazard events. Eventually, this will increase the vulnerability of communities to natural hazards, Indeed, any increase in disasters will threaten development gains and hinder the implementation of the Millennium Development Goals.

Considering the foregoing, it is therefore imperative to come up for a multidisciplinary understanding of disaster risk management is required. Disaster risk management may be seen as a combination of traditional scientific and technical know-how and an appropriate method of decision-taking. There is a strong need for analysis, in theory and in practice,

especially bringing together different interactions between man, nature, and society. But the main question is not how to solve an isolated problem but how to control different interdependent actions. Henceforth, the management of risks became one of the great challenges of the 21st century. Reducing the risk posed by disasters will be key to achieving our development goals. Thus, the ever growing human, economic and environmental losses due to natural and man-made disasters evidence the need for a systematic approach to the management of risks. While natural hazards cannot be controlled, the vulnerability to these hazards can be substantially reduced by *planned mitigation and preparedness measures*. Reducing the risks on disasters is not an optional extra, but it is central to the very success of development itself. It is an urgent priority not only for the disaster managers, but also for the development planners and policy makers

2. OVERVIEW OF THE PROVINCE

2.1 PHYSICAL PROFILE

2.1.1 Location and Boundaries

La Union is located in the southwestern part of the Ilocos Region bounded on the north and northeast by Ilocos Sur; on the south by Pangasinan; on the east by Benguet; and on the west by the Lingayen Gulf and China Sea (Refer to Map 1.)

2.1.2 Political Subdivisions

The province accounts second least in terms of the number of municipalities and barangays, respectively. Under its jurisdiction is one city and 19 municipalities which is equivalent to 16.39 percent of the region, and 576 barangays accounting 17.76 percent of the region's total (see Map 2).

2.1.3 Land Area and Forest Areas

The province has a total land area of 149,309 hectares of which 54,701 hectares or 36.64 percent of the total area is devoted to agriculture. Forest/wooded areas in the province covers 46,598 hectares or 31.21 percent of the province's total.

2.2 GEOGRAPHY

2.2.1 Climate and Weather

The province has two (2) distinct seasons: the wet season which is characterized by abundant rainfall brought about by the southwest monsoon, and the dry season which is characterized by the striking low rainfall due to passing of the northeast monsoon over the Cordillera Mountains.

The striking low rainfall during the dry season from November to April is due to the very effective shielding of La Union from the northwest and even from the trade winds by the mountain ranges of Northern Luzon. As soon as a drift of wind from the southwest

quadrant comes in May, there is an immediate increase in rainfall since La Union is unprotected from the west. Due to depressions and typhoons which come very frequently in the region and owing to the presence of the so-called wet southeast monsoon or moist equatorial air in the China Sea. The months of May to October have abundant rainfall, the maximum occurring in August. The average annual rainfall is (199 mm. in *2000-station 325 to 192 mm. in **2000-station 222). The month of August showed a maximum rainfall of (608.6 mm in *2000 –station 325 vs 646.3 mm. in **2000), respectively. Minimum (tangible) rainfall was seen in March.

2.2.2 Topography and Slope

The province has predominantly hilly terrain, which gradually rises eastward from the shore. The western border is a coastal plain of raised coral alluvium (sand/clay) deposited by flowing water and overlaying older sediments. The irregular coastal plain is narrowest in the south of Damortis, Sto. Tomas and widest in the north at Balaoan where it extends almost 15 kilometers inland from the China Sea. The eastern portion is predominantly mountainous but lower in contour than the Cordillera Mountain ranges of Benguet and Mountain Province with a linear north and south arrangement.

Table 1. SLOPE CATEGORY DISTRIBUTION, BY MUNICIPALITY									
DISTRICT/ MUNICIPALITY/ CITY	LAND AREA (Has.)	AREA BY SLOPE CLASSIFICATION							
		0-8%		8-18%		18-30%		OVER 30%	
		AREA	%DIST.	AREA	%DIST.	AREA	%DIST.	AREA	%DIST.
DISTRICT I	70,069	289.42	51.62	44.49	41.27	266.67	46.05	100.11	40.77
BACNOTAN	6,507	36.82	6.57	1.25	1.16	22.50	3.89	4.50	1.83
BALAOAN	6,870	52.45	9.36	6.00	5.57	9.00	1.55	1.25	0.51
BANGAR	3,604	33.04	5.89			2.25	0.39	0.75	0.31
LUNA	4,489	40.39	7.20	0.25	0.23	4.25	0.73		
SN FDO CITY	10,688	48.63	8.67	10.50	9.74	37.50	6.48	10.25	4.17
SAN GABRIEL	15,500	6.89	1.23	11.84	10.98	100.70	17.39	35.57	14.48
SAN JUAN	5,186	29.19	5.21	4.07	3.78	17.14	2.96	1.46	0.59
SANTOL	8,237	8.75	1.56	8.78	8.14	40.08	6.92	24.76	10.08
SUDIPEN	8,988	33.26	5.93	1.80	1.67	33.25	5.74	21.57	8.78
DISTRICT II	79,240	271.20	48.38	63.31	58.73	312.43	53.95	145.46	59.23
AGOO	5,135	29.85	5.32	6.75	6.26	12.50	2.16	2.25	0.92
ARINGAY	12,207	48.24	8.60	5.73	5.32	62.71	10.83	5.39	2.19
BAGULIN	14,762	1.71	0.31	2.75	2.55	58.76	10.15	84.40	34.37
BAUANG	7,160	41.98	7.49	2.00	1.86	24.75	4.27	2.87	1.17
BURGOS	4,516	0.25	0.04	2.00	1.86	36.16	6.24	6.75	2.75
CABA	4,862	14.00	2.50	2.67	2.48	31.95	5.52		
NAGUILIAN	8,740	33.98	6.06	4.75	4.41	45.42	7.84	3.25	1.32
PUGO	5,585	7.97	1.42	9.50	8.81	2.70	0.47	35.68	14.53
ROSARIO	7,000	42.64	7.61	9.49	8.80	16.75	2.89	1.12	0.46
STO. TOMAS	3,424	20.42	3.64	2.59	2.40	7.46	1.29	1.95	0.79
TUBAO	6,031	30.16	5.38	15.08	13.99	13.27	2.29	1.80	0.73
LA UNION	149,309	560.62	100.00	107.80	100.00	579.10	100.00	245.57	100.00

The highest peak in the province is in the municipality of Bagulin with an elevation of 1,200 feet above sea level. Other areas with an elevation of more than 800 feet are found in San Gabriel and Burgos (see Map 3).

2.2.3 Land and Water Resources

The province has potential surface and groundwater resources that could be used for agriculture and domestic purposes. These resources can sufficiently support the increasing population if fully tapped and explored.

Table 2. MAJOR RIVER BASINS IN LA UNION				
NAME OF RIVER	LENGTH (KM)	DRAINAGE AREA (SQ.KM.)	PROVINCIAL COVERAGE	CLASS
1. Amburayan River	105	1,386	La Union, Ilocos Sur and Benguet	C
2. Baroro River	28	191	La Union	A
3. Naguilian River	55	353	La Union and Benguet	C
4. Aringay River	45	469	La Union and Benguet	B
5. Bued River	70	388	La Union, Pangasinan and Benguet	C

Source of Data: *PENRO*

On surface water, out of 29 river systems in Region I, five (5) are found in La Union. The Amburayan River basin is one of the largest in the region, and stretches along the boundaries of La Union and Ilocos Sur. The other major ones are Baroro, Naguilian, Aringay and Bued Rivers. The province is also endowed with creeks, lakes and streams which dissected every municipality in the province. See Table 2 & Map 4.

2.2.4 Main Geological Features/Mineral Resources

The province's mineral resources are largely non-metallic types consisting of pebbles found in Luna, river sand and gravel deposits in Bangar, Sudipen, Aringay, Bauang, Naguilian, Pugo, Rosario and Tubao.

Among the two (2) mineral resources that the province is producing, sand and gravel has the highest production at 236,864.42 metric tons. The aggregate mineral production is valued at P86,730.14. To address and regulate the problem of excessive quarrying an ordinance to this effect was passed and approved.

2.2.5 Land Classification

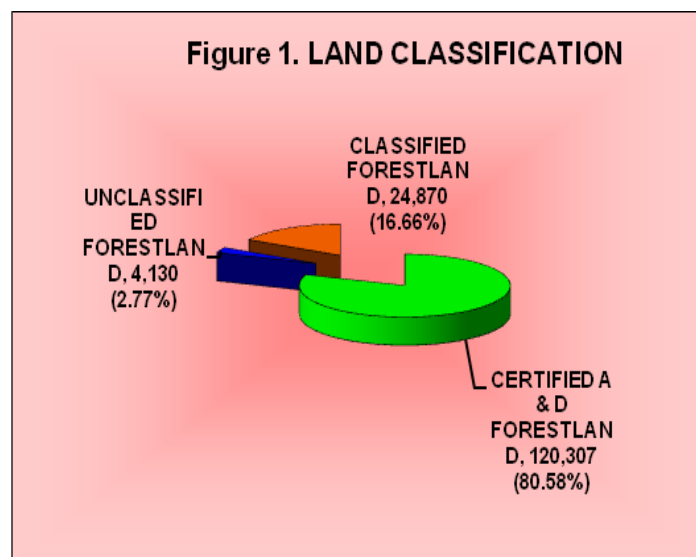
The province has two (2) major land classifications: the alienable and disposable (A & D lands) and the public forestlands. The province's 120,307 hectares of certified A & D lands shared 80.58 percent of the total land area. Public forestlands contributed less at 19.43 percent of the province's total.

Total land areas of Balaoan, Bangar and Luna all classified as A & D. For District I, San Gabriel has the widest A & D land (10,938 hectares). San Juan has the narrowest at 3,788 hectares). As for public forestlands, San Gabriel shares the largest of 43.5

percent among the municipalities in the district. Meanwhile, for District II's certified alienable and disposable (A & D) land, Naguilian has the widest A & D land (8,11 hectares) while Burgos has the narrowest (only 2,553 hectares). Bagulin had the widest public forestlands of 76.29 percent (11,262 hectares) followed by Aringay (8,288 hectares). See Map 5.

2.2.6 Natural Hazards

The Western side of La Union is bounded by the Lingayen Gulf and the South China Sea and is prone to tidal surge due largely to storms. Eastward are the flatlands and the agricultural areas which are susceptible to floods due to the overflowing of rivers. Areas vulnerable to liquefaction western part of La Union particularly in the coastal areas. The eastern half of La Union is prone to land erosion owing to its slope (mountainous) and is on the active fault zone. Highly vulnerable in the towns of Rosario, Tubao, Pugo, Burgos, Bagulin, Santol and Sudipen.



2.3 ADMINISTRATIVE SYSTEM

2.3.1 Population

In the year 2007, the Census of Population showed that La Union has a total population of 720,972 persons. The annual population growth rate from 2000- 2007 is 1.27 percent. According to the 2007 actual population census of the National Statistics Office (NSO), the province's population is seen to double in a span of 54 years, or by year 2054.

The province's population density increased from 441 in CY 2000 to 483 in CY 2007, an indication that 42 persons more were added to the occupants of a square kilometer. Through NSO projections, the province's population density is expected to increase to 513 persons per square kilometers by CY 2010. See Table 3.

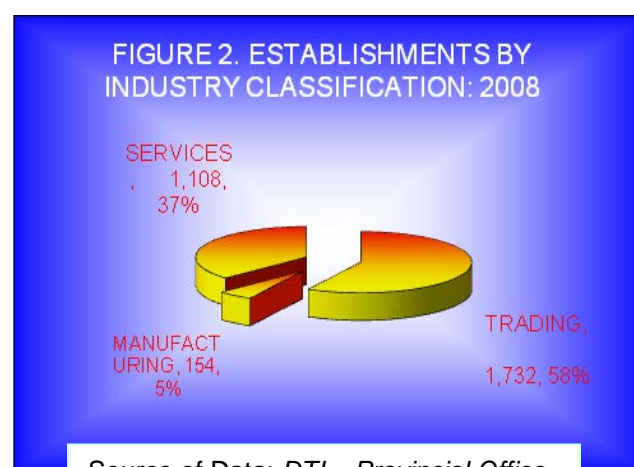
**Table 3. LAND AREA, POPULATION AND POPULATION DENSITY,
BY MUNICIPALITY: 1995-2000-2007-2010**

DISTRICT/ MUNICIPALITY/ CITY	LAND AREA (Hectares)	POPULATION				POPULATION DENSITY (person/sq.km.)				POPULATION GROWTH RATE (%)	
		1995	2000	2007	**2010	1995	2000	2007	**2010	1995- 2000	2000- 2007
DISTRICT I (299)	70,069	279,913	306,640	335,508	354,495	399	438	479	506	1.97	1.25
BACNOTAN(47)	6,507	32,634	35,419	38,743	40,326	502	544	595	620	1.77	1.24
BALAOAN (36)	6,870	31,420	33,786	36,829	37,592	457	492	536	536	1.57	1.2
BANGAR (33)	3,604	28,374	31,491	33,335	34,616	787	874	925	960	2.26	0.79
LUNA (40)	4,489	29,974	32,259	35,372	34,604	668	719	788	771	1.59	1.28
SN. FDO. CITY (59)	10,688	91,943	102,082	114,813	123,794	860	955	1,074	1,158	2.27	1.63
SAN GABRIEL (15)	15,500	13,489	14,909	15,803	16,910	87	96	102	109	2.17	0.81
SAN JUAN (41)	5,186	27,795	30,393	32,952	36,481	536	586	635	703	1.93	1.12
SANTOL (11)	8,237	10,209	11,202	11,712	12,696	124	136	142	154	2.01	0.62
SUDIPEN (17)	8,988	14,075	15,099	15,949	17,476	157	168	177	194	1.52	0.76
DISTRICT II (277)	79,240	317,529	351,305	385,464	411,479	401	443	486	519	2.19	1.29
AGOO (49)	5,135	47,721	51,923	57,952	61,650	929	1,011	1,129	1,201	1.82	1.53
ARINGAY (24)	12,207	36,743	41,422	43,438	47,633	301	339	356	390	2.60	0.66
BAGULIN (10)	14,762	10,780	11,857	12,521	15,562	73	80	85	105	2.06	0.75
BAUANG (39)	7,160	56,189	63,373	69,837	72,391	785	885	975	1,011	2.61	1.35
BURGOS (12)	4,516	6,086	6,748	8,261	8,538	135	149	183	189	2.24	2.83
CABA (17)	4,862	18,234	19,565	20,927	22,794	375	402	430	469	1.52	0.93
NAGUILIAN (37)	8,740	39,989	43,501	45,232	52,390	458	498	517	599	1.82	0.54
PUGO (14)	5,585	12,180	13,442	18,265	17,271	217	241	327	309	2.13	4.32
ROSARIO (33)	7,000	38,376	43,497	49,025	49,250	548	621	700	704	2.72	1.66
STO. TOMAS (24)	3,424	28,192	31,204	33,604	34,824	870	962	981	1,017	2.20	1.03
TUBAO (18)	6,031	23,039	24,773	26,402	29,176	382	411	438	484	1.57	0.88
LA UNION (576)	149,309	597,442	657,945	720,972	765,974	400	441	483	513	2.09	1.27

2.4 ECONOMY

2.4.1 Industry Concentration

As of CY 2008, there are 2,994 commercial establishments operating in the province, most of which are bakeries, tailoring and dress shops, rice mills, furniture's shops, sash and hollow block factories, and 19 major manufacturing establishments. These are the Cement Factory in Bacnotan (HOLCIM), Coca-Cola Plant in San Fernando City, Pepsi Cola Plant in Rosario and the five (5) redrying and flue-curing plants (3 in Agoo, 1 in Bacnotan and 1 in Tubao). Steel Corporation, Ice Plant, Soil Tech Agricultural Products, Pilipinas Shell Petroleum Corporation, Petron, Caltex and Shell Depot are also found in San Fernando City. Other establishments found in the Province include B-Meg Satellite Plant (Feed mill) in San Juan and Bacnotan, Bauang Private Power Plant Corporation and the Shell Liquefied Petroleum Filling Station in Rosario.



Source of Data: DTI – Provincial Office

Out of the 2,994 establishments in the province, more than one-half or 58 percent are trading (1,732); 1,108 offer services and 154 are manufacturing as shown in the Figure 2. More establishments are found in District 1 (1,710 vs 1,284). San Fernando City, being the region's and the province's business center, have the most establishments with 894 or 52 percent of the districts total of 1,710 while Bauang in the 2nd District have the most at 464 or 33 percent of the districts total.

Table 4. EMPLOYMENT AND INCOME GENERATED BY COMMODITY CY 2008		
COMMODITY	EMPLOYMENT GENERATED	INCOME GENERATED (P'000)
Rice	13,704	1,815,526.00
Corn	967	139,772.00
Legumes	812	113,858.00
Vegetables		
- Fruit	729	564,135.00
- Leafy	161	19,668.00
Fruits	1,225	363,339.00
Root Crops	289	193,650.00
TOTAL	17,762	2,157,576.50

2.4.2 Agriculture, Fishery, Poultry

SAFDZ. Strategic Agriculture and Fishery Development Zone. A large part of the province is of watershed/forestry zone which is in the eastern part. In the western part is the lowland which is the strategic fishery/crop sub-development zones. Built up areas are largely located along major roads. See Map 6 for the SAFDZ Map.

In terms of livestock production, the province experiences deficiency in beef due to the consumption of the province's populace. Therefore, the supplies for meat are imported from nearby provinces. The province provides support on the existing 13 slaughterhouses, 1 meat processing plant, 1 poultry dressing plant and 5 feed mills.

Table 5. FISH PRODUCTION AND INCOME GENERATED: CY 2008		
INDICATORS	PRODUCTION (MT)	INCOME GENERATED (P'000)
Freshwater	598	44,850.00
Aquaculture		
Brackishwater	2,584	204,580.00
Municipal Fishing	7,578.20	606,256.00
Communal Fishing	1,404	84,240.00
Commercial Fishing	340	26,692.91
Fish Pens/Fish Cages	1,650	147,709.14
TOTAL	14,154.2	1,114,328.05

Source of Data: OPAG

2.4.3 Tourism

Recognizing the advancing role dominance of the tourism industry in the circle of economy, the Province of La Union in its tourism platform took into consideration its strategic location (as gateway to Ilocandia and Baguio City) and reknown as a place in Ilocandia where the most number of conveniences, supplies and support facilities for visitors are available like a) shopping convenience and personal

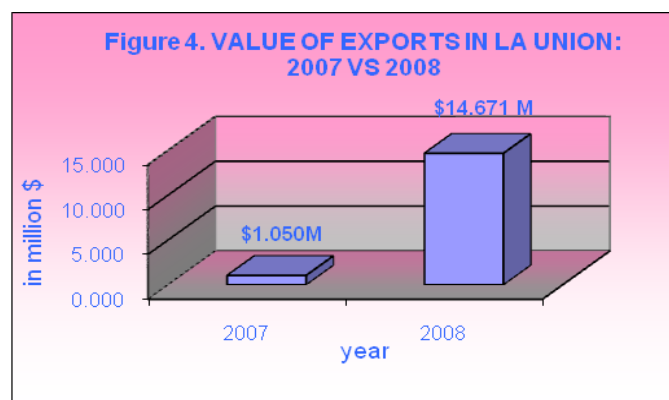
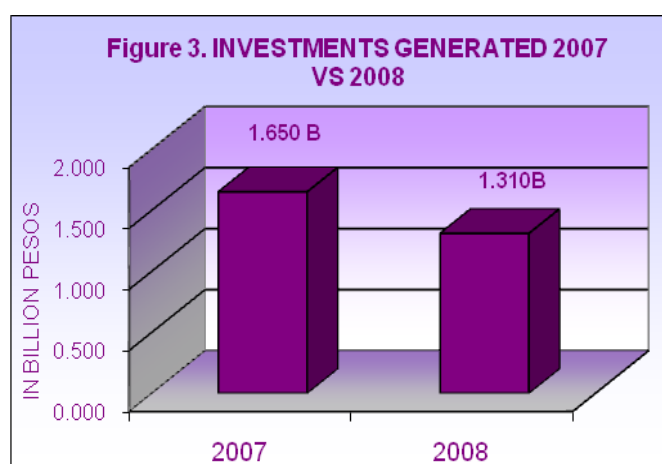
YEAR	TOTAL	FOREIGN	PERCENT	DOMESTIC	PERCENT
2000	84,975	15,232	17.9	69,743	82.1
2001	85,514	14,603	17.1	70,911	82.9
2002	79,608	7,680	9.6	71,928	90.4
2003	76,364	3,625	4.7	72,739	95.3
2004	49,459	3,975	8.0	45,502	92.0
2005	36,971	3,506	9.5	33,412	90.5
2006	49,300	6,326	12.8	42,447	87.2
2007	56,538	5,950	10.5	50,351	89.5
2008	62,662	12,181	19.4	50,481	80.56

services, b) variety of hotel accommodations and restaurant facilities, c) entertainment facilities, souvenir and gift shops, d) parks, beaches, forest and other nature centers, e) transport terminals such as airport, seaport and land transportation, f) central bank, commercial and rural banks, and foreign currency exchange, etc.

2.4.4 Investment, Exports and Job Generation

The province is strategically positioned as international shipping, air route and land based transports that attract both local and foreign investments. It is the growth center of education, trade, and commerce in Region I and endowed with a well skilled manpower. Major developmental projects have been established like the Poro Point Special Economic and Freeport Zone and the on-going negotiation of the Regional Industrial Center and various infrastructure projects to generate more investments not only in the province but also in the entire region.

The PSEFPZ through the John Hay Poro Point Development Corporation continues to entice investors into the province. The Thunderbird Gaming Corporation expanded to include not only casinos but a five star hotel and a 9-hole golf course, including the San Fernando airport into international standards. back-to-back with the seaport modernization.



2.5 HOUSING

In 2000, the province has a total of 123,994 occupied dwelling units for 127,579 households giving a ratio of 1.03 households per housing unit compared to 1990 of 97,673 occupied dwelling units or an increase of 2.89 percent.

Table 7. OCCUPIED HOUSING UNITS, LA UNION: 1990-2000				
TYPE OF BUILDING	1990	%	2000	%
Single House	94,987	97.25	118,499	95.57
Duplex	1,404	1.44	3,062	2.46
Multi-Unit Residential	1,116	1.14	1,464	1.18
Commercial/Industrial/Agri cultural	132	0.14	303	0.24
Institutional Living Quarter	14	0.01	11	0.01
Other Housing Unit	19	0.02	37	0.03
Not Reported	1	-	618	0.5
LA UNION	97,673	100	123,994	100
Source of Data: NSO (1990-2000 POPCEN)				

2.6 SOCIETY

2.6.1 Religious Sects

The inhabitants of La Union as of CY 2000 are predominantly Roman Catholic comprising 86.71 percent of the total population. About 2.42 percent are Iglesia Ni Cristo members while the Evangelical Church and the United Church of Christ in the Philippines accounted to 2.31 percent and 1.64 percent, respectively.

2.6.2 Ethnic Groups

In 1995 and 2000, total population of the six (6) identified indigenous municipalities is 66,819 and 73,257, respectively.

3. CLIMATE CHANGE – ITS IMPLICATIONS TO DEVELOPMENT

3.1 CLIMATE CHANGE DEFINED

- increase in the average temperature of Earth's near-surface air and oceans since the mid- 20th century and its projected continuation
- refers to changes in modern climate; may be qualified as anthropogenic climate change, more generally known as "global warming"

3.2 KNOWLEDGE BASIS ON CLIMATE CHANGE AND DISASTER RISK MANAGEMENT

- ❑ In late 2007, the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report drew together the scientific evidence on climate change. This report states that "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level."
- ❑ Observed changes in climate and weather extremes include:
 - increase in areas affected by drought since the 1970s
 - more frequent heat waves over most land areas,
 - increase in the frequency of heavy precipitation events over most areas,
 - increase in the incidence of extreme high sea level,
 - increase in intense tropical cyclone activity since about 1970
- ❑ These observed changes in climate are likely to continue into the future. The IPCC Fourth Assessment Report states that Greenhouse gas emissions at above current rates will cause further warming and induce other changes in the global climate system during the twenty-first century that very likely will be larger than those observed in the twentieth century.
- ❑ Events such as droughts, floods, landslides and storms are often terrible experiences for those affected - they cause great loss of life, destroy countless livelihoods and leave millions of people devastated. In the coming decades, climate change is expected to exacerbate the risks of disasters not only from more frequent and intense hazard events but also through greater vulnerability to the existing hazards.

3.3 ITS IMPLICATIONS

3.3.1 The Population

The annual population growth rate of 1.27 percent (2000-2007) with the urban area having the highest percentage share attributes to greater structural requirements and its impact on settlement patterns and natural resources also makes itself

particularly felt in the province. Moreover, the rapid rise in population has not just caused a drastic increase in the density of settlements; it has also altered their distribution pattern and land use. There is, for example, a growing migratory trend towards valleys and slopes under threat of flooding, landslides and earthquakes, particularly on the outskirts of large and medium-sized conurbations. These are growing too fast for the requisite planning and building regulations to be drafted and supervised.

3.3.2 Sectoral Implications

Global warming is resulting in an increase in the frequency and severity of climatic extremes, which increases the frequency of weather-related disasters. Climate change hits the poor hardest and the greatest impacts are likely to be on food security, the productivity of agricultural export crops, health, and water security and quality. It is also likely to increase the displacement of people as a result of flooding or drought.

Climate-related stresses and shocks already figure prominently in the lives of many of the people and particularly so in the lives of the poor. We're only a few degrees of global warming away from dangerous climate change. Although this will affect everyone, it poses the biggest challenge to people living below poverty threshold..

The implications of the effects of climate change to the different sectors is shown in Table 8.

4. DISASTER RISKS IN LA UNION

4.1 THE PROVINCE'S VULNERABILITY TO THE IMPACT OF DISASTER

Indeed, the Philippines is subjected to various types of hazards due to its geographical location being in the "Pacific Ring of Fire". This ring is a zone of frequent earthquakes and volcanic eruptions that encircles the basin of the Pacific Ocean.

Consequently, La Union has had its share of earthquakes, tropical cyclones, and floods. due to its physical environment The province is constantly beset by these hazards particularly the strong typhoons with a high frequency of occurrence, broad distribution areas, and severe consequences in losses. These natural calamities cost the local government so much cost in direct damages. Such regular events have enormous, though rarely quantified, impacts on the economic, socio-cultural, and institutional capacities in the province.

A major earthquake hit La Union on July 16, 1990 measuring 7.7 on Richter scale and lasted for 45 seconds. Five municipalities were severely affected and these include Agoo, Aringay, Caba, Sto. Tomas, and Tubao with a combined population of 132,208. Many buildings collapsed or were severely damaged. 100,000 families were displaced when two coastal barangays sank due to liquefaction. The province suffered many casualties and 32 of them died.

The two mega-typhoons that hit the Philippines last year did not spare the Province of La Union. The Province experienced waist high floods particularly on the municipalities where the five major river basins are located. Agricultural lands were flooded and further silted the production areas. Coastal, riverbanks and mountain erosions became fearful sights for the population. A change of landscape has been observed in the entirety of the province. This was further aggravated by the waterborne diseases affecting the populations at-risk.

4.2 DISASTER RISKS ASSESSMENT AND EVALUATION

A study on the disaster risk assessment and evaluation conducted in the Province with the assistance of National Economic and Development Authority (NEDA) was made focused on three (3) factors, thus, on earthquake- induced landslide, rain-induced landslide, , and liquefaction.

Moreover, a survey was also conducted by the Department of Environment and Natural Resources-Mines and Geosciences Bureau (DENR-MGB) - Region 1 Geohazard Assessment Team identifying the areas of flooding and landslide in La Union after the occurrences of Typhoons “ONDOY” and “PEPENG” as contained in their report “Results of the MGB Geohazard Assessment of Barangays in La Union” with the assessment conducted on February 2010. The study covered 12 municipalities in the province. Each barangay were classified as having high, moderate, and low landslide susceptibility. Additional part of the report was a *Landslide Threat Advisory* indicating the susceptibility of these barangays in landslides.

Included also in this report is a result of the study on coastal erosion in La Union of Dr. Fernando P. Siringan of the Diliman Science Research Foundation, Inc (UP) which was commissioned by the Provincial Government of La Union in year 2006 and this coastal study covered the 13 coastal municipalities of the province..

4.2.1 Earthquake Related Hazards

The province of La Union lies in a tectonically active area (Map 7). The Manila Trench where the South China Sea Plate subducts, is less than 200 km away. The Province is traversed by numerous faults that limit varying degrees of land development particularly horizontal and vertical structures. A splay of the active Philippine Fault is believed to pass through the province's coastal waters and other associated faults cut through the area. The northern coast of La Union, based on MGB geologic maps (1985a; 1985b), is underlain mainly by folded Miocene to Pliocene interbedded sandstone, shale and siltstone with minor tuff, sandy limestone and pebble conglomerate of the Rosario

Formation. Quaternary uplifted coral reefs outcrop along the coast from Quirino in Bacnotan to Carisquis in Luna (Siringan F. P. et al (2006).

Map 8 shows the earthquake and tsunami prone areas in the province. The Ilocos coastal zone is prone to storm surges and tsunamis which may be induced by movement within the Manila Trench in the South China Sea. The coastal portions of La Union are likewise vulnerable to liquefaction.

4.2.2 Assessment of Susceptibility of Land Uses to Earthquake-Induced Landslides

Settlement Land Use

Susceptibility

Map 9 briefly describes the susceptibility of the different municipalities in the province relative to landslides brought about by earthquake. A total area of 94,424 hectares (944.2400 sq. kms.) are likely to be susceptible to landslides induced by earthquake. This is 63.24 percent of the total land area of 149,309 hectares in the province. The upland municipality of San Gabriel has the highest susceptibility level gaining 15,775.60 hectares (157.756 sq. kms) followed by another upland municipality of Santol with 8,757.80 hectares (87.578 sq. kilometers), and the City of San Fernando with an area of 7,977.20 hectares (79.772 sq. km.) which has also considerable upland areas.

Risk of Fatality

Referring to Map 10 (Fatality Assessment), more than 60 percent of the municipalities including the city were recorded with very high fatality as to landslides incurred by earthquake. The City of San Fernando (0.31379837) and the municipalities of Naguilian (0.16152885) and Bauang (0.14181320) have their population at greatest risk during an event of earthquake-induced landslides.

Production Land Use

Agricultural Production Areas

La Union has a total agricultural land area of 20,488.00 hectares (204.880 sq. kms.) that are at risk to be affected by earthquake-induced landslides, and this is 14 percent of the province's total land area. Highly vulnerable areas are the City of San Fernando (2,356.60 has.) and the municipalities of San Gabriel (2,182.70 has.) & Bacnotan (1,276.80 has.) for the First District; and the municipalities of Rosario (1,998.50 has.), Bagulin (1,681.80 has.), and Naguilian (1,429.10 has.) for the Second District. Refer to Map 11.

Forest production Areas

As shown in Map 12, La Union has a total of 64,654.60 has. (646.546 sq. kms.) of production forest areas that have high vulnerability to land slides brought by earthquake

with the highland areas of Santol, Aringay, Bagulin, Naguilian, and San Fernando for a total combined area of 29,545 hectares.

Protection Land Use

The study conducted revealed a total protection land use area of 73,350.80 has (733.508 sq. kms.) in La Union that are exposed to high risk to earthquake-induced landslides with the adjacent municipalities of Sudipen (2,043.20 has.) and Bangar (1,106.10 has.) displaying the widest risk areas. See Map 13.

Roads and Bridges

Around 24,006.00 kilometers of road networks in the province are estimated to be affected by earthquake-induced landslides with Aringay (31.769 km.), Tubao (29.219 km.), the City of San Fernando (27.070 km.), Naguilian (25.548 km.), and Sto. Tomas (21.077 km.) having the longest stretches of roads to be at risks. Refer to Map 14.

4.2.3 Assessment of Susceptibility of Land Uses to Rain-Induced Landslide

Susceptibility

There are much areas in the province that are posed with moderate to high susceptibility levels of threat to rain-induced landslides and these are mostly located along steep slopes. For the first district, these are found in the upland areas of San Gabriel (15,740.30 has.), Santol (9,085.28 has.), San Fernando (8,622.33 has.), and Sudipen (5,288.01 has.); while in the second district are in the municipalities of Bagulin (7,004.50 has.), Naguilian (6,690.26 has.), and Bauang (5,112.43 has.). This is reflected in Map 15.

Risk of Fatality

As shown in Map 16, the highest risk is seen at the city of San Fernando (0.279) and the municipalities of Bauang (0.173) and Naguilian (0.163), but the probability of risks is very low since it is within the acceptable international standard.

Production Land Use

Agricultural Production Areas

With continuous rains that will be brought by intense typhoon that frequently visited the province, rain-induced landslides will threaten a total of 23,470 hectares (234.70 sq. kms.) of agricultural lands and these comprised 16 percent of the total land area of the province. Areas mostly affected will be the agricultural lands in the municipalities of Bauang (3,931 has.) Sto. Tomas (2,236 has.), and San Gabriel (2,197 has.) and the City of San Fernando (2,707 has.). Refer to Map 17.

Forest Production Areas

La Union has a total land area of 70,023 hectares (700.23 sq. kms.) of production forest covers that are highly susceptible to rain-induced landslides with San Gabriel gaining the largest area at 12,724 hectares, followed by Santol (7,550 has.), Aringay (6,453 has.), and Bauang (6,250 has.). This is shown in Map 18.

Protection Land Use

A total 8,211 hectares (82.11 sq. kms.) of protection land use in the province are highly prone to rain-induced landslides. Most areas are in moderate susceptibility. See Map 19.

Roads and Bridges

Shown in Map 20 is the 294.593 kilometers of road network that are highly vulnerable to damage caused by rain-induced landslides. Bauang is shown to have the longest road length of 38.911kms. followed by San Fernando at 36.021 kms., and subsequently by Aringay and Tubao at 31.980 kms and 29.914 kms., respectively.

As per study conducted by NEDA, a total of 11 bridges that are at risk by rain-induced landslides.

4.2.4 Assessment of Susceptibility of Land Uses to Liquefaction

Liquefaction Susceptible Areas

Several splays of the active Philippine Fault pass thru La Union (refer back to Map 7). The earthquake in 1990, generated along the Philippine Fault, led to liquefaction and earthquake related subsidence in Aringay, Agoo and Sto. Tomas. In Aringay and Sto. Tomas, shoreline retreat accelerated after subsidence occurred. In Dalumpinas and Ilocanos Norte, anecdotal accounts indicate the occurrence of uplift during earthquake (Siringan et. al., 2004a). In Ilocanos Norte, a certain Barangay Captain recounts that during the 1990 earthquake, the sea receded more than 100 meters but returned to its former position a few days after. Similarly, the reef flat in Dalumpinas was observed to have become emerged during the earthquake but subsided during the aftershocks.

Susceptibility

A total of 30,081.15 hectares (300.8115 sq. kms.) of the province's land area are highly susceptible slides induced by continuous rains. As shown in Map 21, Luna gained the highest with 3,444.42 has., followed by the different municipalities of Bacnotan (3,317.39 has.), Bangar (2,986.56 has.), Bauang (2,861.04 has.), and Balaoan at 2,456.04 has.

Production Land Use

Agricultural Production Areas

La Union has a total area of 23,218 has. (232.18 sq. kms.) agricultural land that will be affected by liquefaction. Widest areas to be affected as such are the municipalities of Luna (2,851.01 has.), Bacnotan (2,575.04 has.), and Balaoan (2,311.12 has.), as reflected in Map 22.

Forest Production Areas

Referring to Map 23, forest production areas that shall be affected by liquefaction will reach to a total 2,951 hectares (29.51 sq. kms.) with San Juan gaining the highest at 508.594 hectares and Bacnotan at 453.258 hectares.

Roads and Bridges

Around 323.834 kms. of roads in the province will be affected by liquefaction with Bauang having the longest length at 47.277 kms., Bacnotan at 45.025 kms., Sto. Tomas with 33.804 kms., and Agoo at 30.757 kms. This is shown in Map 24.

4.2.5 Coastal Erosion in La Union

Coastal erosion is not unique to La Union, In fact, it is a global phenomenon striking coastlines around the world. It is of particular concern because the projected rise in sea level within the next century can further aggravate erosion.

Possible Causes of Changes in Shoreline Position

Changes in shoreline position along the northern coast of La Union since the 1900s can be attributed to natural and anthropogenic factors. Natural causes include changes in climate such as storm frequency and intensity, amount of precipitation and spatio-temporal distribution, earthquakes and shifting position of river mouth. These factors influence the magnitude of sediment delivered and distributed along the coast. Lateral shifts of the river mouth position also lead to changes in the sediment budget along the coast; sediment supply increases in the area where the mouth shifts to but a deficit, leading to erosion, occurs in the previous position. Anthropogenic forcing, on the other hand, encompasses human activities that alter the natural distribution or quantity of beach materials such as mining and quarrying, construction of structures that impede the long shore drift, destruction of natural features that protect the coast such as mangroves, and sand dunes, to name a few (Coastal erosion study in Northern La Union Siringan, F.P., et al, 2006).

In some cases, accretion is related to channel migration and formation of new distributaries on the delta. One prominent case is in Bangar wherein according to a municipal report (2000), “52.51 hectares of land was added in Paratong while 67.3 hectares was lost in Caggao”. A southerly migration of the channel south of Mindoro eroded Caggao and part of the eroded material was transported to Paratong Norte. While the main channel lies north of Mindoro, smaller channels cut across the delta plain and pass through riverside barangays resulting in erosion. A new distributary that cuts through Mindoro and is continuing to threaten what is left of the island. Other observed cases was in Bacnotan where residents of Galongen pegged the “1940s shoreline at 30-65 m seaward of its current position and indicated that erosion slowly occurred in the 1960s and 1970s”. A Pandan resident narrated that “in the 1960s, Filmag removed approximately 20-m wide and 3-m thick beach sand”. Anecdotal accounts revealed that the “coastline from Galongen to Baroro was mined by Filmag for magnetite sand in the 1960s-70s. Likewise, until 2003, Bacnotan Cement, now Holcim, used to gather sand along the Quirino coast for cement additive”. From the 1970s onwards, almost the entire Bacnotan coast is showing recovery from erosion except the boundary between Tamocalao and Cabarsican, which has lost as much as 90 m of beach area since the 1900s.

Net erosion predominates in Luna, Bacnotan and San Juan during the past century.

4.2.6 Situation of the Watershed Areas in La Union

Six river systems debouch along the coast of La Union draining its watershed (Fig.5); the largest is Amburayan River with a watershed of 1386 square kilometers (sq. km.) straddling the provinces of La Union, Ilocos Sur and Benguet. Its main channel serves as

the provincial boundary of La Union and Ilocos Sur, thereby delineating the northernmost extent of the former. Other river systems have smaller watersheds: approximately 191 sq. km. for Baroro River and less than 80 sq. km. for Darigayos and Maragayap rivers. The NW-SE trending Baroro River flows between the towns of San Juan and Bacnotan while the meandering Maragayap River runs through the latter. Farther north, Darigayos River marks the boundary between Balaoan and Luna. In contrast, two relatively large river systems, Bauang and Aringay Rivers, with watershed areas respectively of 516 sq. km. and 469 sq. km. drain the southern towns of La Union.

South of Maragayap River, erosion between 50 and 100 m had been most severe from the 1900s to 1970s while progradation appears to be taking place in recent years. A possible reason is the shift in the course of Maragayap River. Between the 1940s and the 1970s, the river mouth shifted to a more southerly position which may have contributed to progradation that is now occurring to the south: barangays Galongen and Tamocalao has regained approximately 40 to 80 m of land since the 1970s, and at present, are located seaward of the 1940s position.

Anthropogenic Factors. Shoreline erosion is often tied to changes in land use and land cover that alter the sediment yield of watersheds such as deforestation, agriculture and infrastructure developments. The silted mouths of rivers in northern La Union suggest high sediment yields of the watersheds. However, the high sediment yield of the watersheds is incompatible with coastal erosion that is prevalent in Bacnotan and San Juan. In San Juan, the largest magnitude of land loss, at 41 hectares, occurred from the 1900s to 1940s while accretion of about 14 hectares ensued from the 1940s to 1970s, which was offset by land loss of as much as 15 hectares from the 1970s to present. Bacnotan, on the other hand, appears to be recovering from erosion; from a land loss of about 40 hectares between 1900s and 1970s to a land gain of about 26 hectares since the 1970s (Siringan, F.P., et al, 2006).

5. ISSUES AND CHALLENGES IN SUSTAINABLE DEVELOPMENT OF THE PROVINCE OF LA UNION

ECONOMIC FACTORS

- Limited governmental financial resources available for disaster risk management;
- Settlements on coastal areas partly contribute to environmental degradation leading to their own higher disaster risk;
- The economies depend on a few products (low level of diversification) and the danger is particularly great if these sectors are vulnerable to disaster (e.g. agriculture).

SOCIO-CULTURAL FACTORS

- Insufficient knowledge and awareness of the cause effect of disasters, people are less able to respond appropriately in a changing environment.
- The traditional practice of slash-and-burn causes erosion bringing the people in greater vulnerability.
- The population is not prepared to engage in mutual support schemes and organize themselves in order to negotiate competing interests in the search for greater levels of general welfare.
- The absence of warning systems makes them more vulnerable to natural disasters

POLITICAL-INSTITUTIONAL FACTORS

- Legislation is lacking, is not commensurate with the hazard or is not implemented (development and land use planning, building regulations).
- The personnel and financial resources available for disaster risk management and preparedness are inadequate.
- Roles are not properly or clearly assigned and there is a lack of coordination in and amongst the responsible institutions (including centralism: insufficient power for local actors).
- Democratic institutions are underdeveloped. The low level of participation of the population in democratic processes diminishes their self-help capabilities.
- Mechanisms and instruments for spreading financial risks are lacking or inadequate (e.g. disaster funds, insurance).

6. DISASTER RISK REDUCTION:

What is disaster risk reduction?

Disaster risk reduction (DRR) strategies aim to minimize the effects of natural hazards such as earthquakes and cyclones on communities by reducing their vulnerability to loss of life and livelihoods, within a broad context of sustainable development. This may include protecting and diversifying livelihoods, for

example through crop diversification as well as tackling chronic food insecurity. Tackling the causes of hazardous events is also crucial, for example reducing the likelihood of landslides through reforestation or ensuring appropriate cropping and water-use practices in drought-prone areas. Risk reduction involves actions taken to reduce the overall risks associated with disasters. Such actions include short-, medium- and long-term sectoral planning, early warning systems, and emergency preparedness mechanisms. For this study, this includes risk assessment and management, mitigation measures, and preparedness.

7. WHY DISASTER RISK MANAGEMENT

As previously discussed, a multidisciplinary understanding of disaster risk management is required. Disaster Risk Management programs will reduce the impact of natural disasters on vulnerable communities by strengthening national capacity to prevent, coordinate and respond to natural disasters. DRM programs worked to support and deepen the government's capacity to implement disaster reduction policies, strengthen governmental coordination mechanisms, take advantage of new technologies for assessments and monitoring (allowing for greater predictability and shorter response times) increase public understanding of risk, vulnerability and disaster reduction, enhance commitment to and stimulate interdisciplinary and inter-sectoral partnerships, locally, nationally and regionally.

7.1 PARADIGM SHIFT – FROM RELIEF AND RESPONSE TO DISASTER RISK MANAGEMENT

The disaster itself causes disruption to economic development, which is overcompensated at first by the rapid provision of additional capital. After the additional funds for emergency aid and reconstruction have been consumed, the local economy has to cope with the remaining adverse effects on its own

Until a few years ago, disaster relief was a major intervention area whenever sudden events disrupted the functioning of society and overstretched available self-help capabilities. Due to the close link between disasters and development, there's a need for the introduction of disaster prevention measures in development planning and the establishment of national systems for comprehensive disaster risk management. The Secretary General of the United Nations himself has expressly demanded a paradigm shift from the prevalent 'culture of reaction' to a 'culture of prevention'.

7.2 THE NEED FOR DISASTER RISK MANAGEMENT

"Development can only be sustained if it enables a society to prevent or cope with disasters."

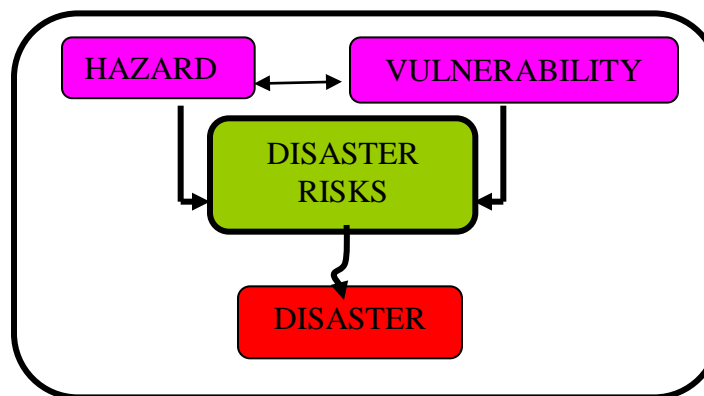
Natural disasters are closely bound up with the development status of a region they disrupt or impair development and, at the same time, a low level of

development increases the chances of them occurring. How do we face these natural disasters without the victims getting flatfooted?

“There seems to be no systematic way of addressing or responding to natural `disasters here in the Philippines, but disasters have been with us since time immemorial,” says Dr. Arsenio M. Balisacan, Director of SEARCA.

The disaster risk (of a region, a family, or a person) is therefore made up of two elements: the **hazards** – the potential damaging events or phenomenon; and the **vulnerability** of populations to these hazards. Thus, *disaster risk* results from the combination of a potential damaging event (hazard) and the degree of susceptibility of the elements exposed to that source (vulnerability);

Natural hazards by themselves do not cause disasters; it is the combination of an exposed, vulnerable and ill-prepared population or community with a hazard event that results in a disaster. Human activity, such as land use changes, environmental exploitation and unplanned settlement, often exacerbates the level of disaster risk.



Components of disaster risk.
Source: GTZ, Eschborn 2001.

Hazard. Hazards are extreme natural events with a certain degree of probability of having adverse consequences. A distinction also needs to be drawn between a real natural hazard and a socio-natural hazard. Given the complex set of influences, this distinction is difficult to make, but it is useful in helping define disaster risk management measures.

Vulnerability. Vulnerability denotes the inadequate means or ability to protect oneself against the adverse impacts of natural events and, on the other hand, to recover quickly from their effects. Vulnerability comprises very diverse, often mutually reciprocal, factors that have to be taken into account to determine the vulnerability of a family, a village or a country.

Whereas, with truly natural phenomena, people exert no influence as regards their occurrence, socio-natural hazards are induced or aggravated by a combination of extreme natural events and human interventions in nature. Only a few hazards,

earthquakes for example, occur as purely natural phenomena; most others, such as floods and landslides, can come about with and without human intervention.

Hazards can be narrowly confined to a locality or threaten entire regions. So a hazard is a variable whose intensity and probability can differ by place. This has a considerable influence on the levels of possible damage. To be able to reduce hazards or prepare for them, we have to ascertain their potential.

To a certain extent, it is possible to obtain quite a full picture of possible hazards from the history of past events. To exactly identify the possible size of the hazard, however, this information must be supplemented by professional assistance and modern technology. Reference presentation is shown in Figure 6 as to the interrelationship of hazard and vulnerability resulting to disaster.

7.3 DISASTER RISK MANAGEMENT AS MEANS TO ADVANCE ADAPTATION TO CLIMATE CHANGE

Disaster risk management and risk reduction strategies are approaches that seek to build resilience and reduce vulnerability, and therefore offer capacities to support adaptation, in respect to coping with extreme events such as drought, floods and storms as well as addressing longer term issues such as ecosystem degradation that increase vulnerability to these events.

Generally there are clear inter-relationships between tackling climate change and disasters. climate change will increase the number and scale of disasters that need to be managed. Henceforth, disaster risk management is a natural entry point for adaptation. Disaster risk management focuses on building the institutional basis for risk reduction; increasing scientific and popular understanding of risk; strengthening early warning systems; improving natural resource management and construction practices; promoting preparedness for emergency response; and mobilizing resources for and implementing emergency response and rehabilitation operations

8. THE DISASTER RISK MANAGEMENT PLAN

8.1 VISION, MISSION AND OBJECTIVES

a. VISION:

La Union as disaster-resilient province with strong social cohesion and cooperation among the population against the challenges posed by disaster.

b. MISSION:

- Vulnerabilities of the population at risk having been reduced by building on and strengthening local coping strategies and capacities.
- Having confidence among individuals, households, communities in undertaking disaster preparedness and mitigation as well as other development-related endeavors. This leads to self- and community empowerment

c. OBJECTIVES

- To enable people to anticipate disasters and take action to protect life and property, and to ensure sustainable social and economic development.
- To establish principles and guidelines on various aspects of Disaster Management and making the people increasingly resilient to disaster.
- To entail activities supporting the pursuit of an optimal balance between disaster risk reduction, risk-sharing mechanisms, and management of residual risks in the face of limited resources.
- To strengthen government and non-government organizations, physical infrastructures and the capacities of the communities in meeting the challenges posed by disasters in the Province.
- To seek in filling knowledge gaps, providing a clearing-house for information, building know-how, mobilizing resources, and forging partnerships with governments, private enterprises, international agencies, and NGOs.

9. FRAMEWORK FOR DISASTER RISK MANAGEMENT

Based on the need for disaster risk management, basic concern must be to avoid isolated individual activities and put together an 'intervention package' of concerted measures wherever possible. Based on a systematic analysis of hazards and vulnerabilities and involving all the major actors, this must define and link the necessary fields of activity for risk reduction.

Disaster Risk Management for the Province shall be framed under six (6) interdependent fields of activity, and these are : ***Risk Identification and Assessment, Risk Reduction (Mitigation), Disaster Preparedness, Disaster Response, and Recovery.*** These should be supported by ***effective governance*** (e.g. legislation, policies, planning, etc), and ***information and knowledge sharing mechanisms*** among different stakeholders. (Please refer to Figure 7.)

10. STRATEGIC AGENDA (PRIORITY STRATEGIES FOR DISASTER RISK MANAGEMENT IN LA UNION)

This section describes the strategies and interventions that the Provincial Government of La Union through the Provincial Disaster Coordinating Council (PDCC), the LGUs, the stakeholders and the communities will implement in order to reduce disaster risks, prepare for, respond to and recover from them. For the purpose of this Plan, disaster risk management are framed under the five (5) aforementioned main areas: Risk Identification and Assessment, Risk Reduction (Mitigation), Disaster Preparedness, Disaster Response, and Recovery, supported by effective governance and information & knowledge sharing mechanisms among different stakeholders.

On the process of identifying the appropriate strategies and programs & projects for disaster risk reduction, a disaster risk management forum and workshop was called by the Provincial Government of La Union which was attended by more than 150 members of the Provincial Disaster Coordinating Council comprising the representatives from various national government agencies operating in the province, non-government organizations, the private sector, the academe and the media sector. The participants indicated their full support through a covenant. This initiative is an opportunity for the province to come up with an effective disaster risk management plan.

On this activity, the disaster management partners were grouped/assigned to their respective designated working committees (based from the identified action arenas). Each committee was able to identify current issues and problems (**blocks**) of DRR and CCA implementation at the local level during the workshop, and their corresponding strategic actions, with emphasis given on identification of strategies as agreed by the stakeholders for priority hazards in the province which have caused great damage and losses in the past, or which stakeholders believe have the potential to do so in future. These are enumerated in the following section, thus:

ACTION ARENA No. 1: RISK IDENTIFICATION AND ASSESSMENT

Risk identification involves quantification of risk through understanding hazard, vulnerabilities and exposure patterns. This knowledge is essential for development of strategies and measures for reducing the risks. It provides the first essential step for development of sound risk management strategies. A fundamental requirement is the availability of historical and real-time, systematic and consistent, observations of hydro-meteorological parameters, complemented with other forecast products providing information on expected patterns of hazards from the next hour to longer time frames. This must be complemented with vulnerability and exposure information, tools and methodologies for hazard analysis, mapping as well as sectoral risk assessment and modeling. All good risk management approaches should possess the following characteristics: *planned and documented* risk management process based on a *prospective*

assessment; assessment is periodically reviewed in order to validate the initial findings and to uncover new problem areas; application of defined set of evaluation criteria to cover all aspects of the process; and on-going results of the risk management process formally documented.

Blocks (Constraints):

- Inadequate data on climate impacts (damage and loss);
- Unavailability of reliable and regularly updated database on hazard characterization, disaster risk estimation and evaluation.
- High acquisition cost of GIS-based maps and other GIS programs.
- Lack of expertise in DRR/vulnerability assessment.
- Need for timely and reliable forecast of an incoming disaster – typhoon, floods, drought, tsunami, etc.

Strategic Goals:

- Established climate information that is understandable and usable by policy and decision-makers and communities at risk.

Strategy #1:

- To come up with a systematic study of the risk assessment and vulnerability in respect of main hazards facing the province as basis for the formulation of specific action plan to handle such disasters.

Priority Actions #1:

- 1.1 Establishment of centralized MIS-GIS access facility in the province.
- 1.2 Registering past disasters and major natural events in the province – collect/gather available data and maps in the province for assessment.
- 1.3 Conduct precise studies on geologic and climatic hazards & their causes.
- 1.4 Conduct surveys/profiling of endangered population by gender & their vulnerability.
- 1.5 GIS-based hazard and vulnerability mapping and risk assessment in all the identified multi-hazard prone barangays in the city and 19 municipalities with special emphasis on vulnerability and risk of women, disabled persons and children, to help in formulating gender equitable and sustainable community plans for disaster preparedness.
- 1.6 Conduct of training with integrated modules to physical planning.

Strategy #2:

- Building up appropriate decentralized *early-warning systems* to ensure that endangered population relevant local and national actors receive timely information.

Priority Actions #2:

- 2.1 Establishment of centralized MIS-GIS access facility in the province.
- 2.2 Installation of Information Technology (IT) based early warning systems in the operation center back-to-back with procurement of technical equipment and training of operators.
- 2.3 Strong coordination among communication servicing networks for sharing of information, data, and issuance of warnings that take vulnerabilities and exposure of elements into account.
- 2.4 Communication and dissemination system that ensures warnings are received at community levels through clear protocols and procedures that are regularly tested, evaluated and maintained.
- 2.5 Procurement of communication gadgets.
- 2.6 Pro-active IEC on concerned hazards coming up with a timely and reliable disaster forecasting.
- 2.7 To install emergency hotlines or disaster related signages in conspicuous places for public awareness and information

ACTION ARENA No. 2: DISASTER PREVENTION AND MITIGATION

It denotes activities that prevent or mitigate the adverse effects of extreme natural events, above all in the medium and long term. These include on the one hand, *political, legal, administrative and infrastructure measures* to address the hazard situation, and, on the other, influencing the lifestyle and behavior of the endangered population in order to reduce their disaster risk.

Blocks (Constraints):

- Inadequate heavy equipments and ready transport vehicles.
- Unplanned drainage systems e.g. diverted natural waterways due to urban development.
- Presence of vulnerable areas prone to landslides, soil erosions, floodings (on high and lowland areas).

Strategic Goals:

- Develop disaster-reducing activities as part of sector-specific adaptation strategies.

Strategy #1:

- Local regulation and enforcement of laws

Priority Actions #1:

- 1.1 Planning, budgeting and implementing risk reduction policies (e.g. to avoid settlement in hazardous areas and to ensure that hospitals and schools are hazard resistant).
- 1.2 Setting and enforcing local development and land use plans, building supervision plans as well as zoning ordinances and building regulations.
- 1.3 Strict implementation of existing environmental laws.
- 1.4 Sustainable resource management and expansion of forestland. This includes control of deforestation and slash-and-burn forest clearance, reforestation and implementation of sustainable forest management schemes, agroforestry development and enrichment planting, and watershed management.
- 1.5 Sustainable management of our waterways by setting buffer zones on river flood plains, planting of trees and other vegetation types on riverbanks and possible reinforcement using infrastructure such as dams, dikes and embankments.
- 1.6 Adjusting infrastructure to anticipated events including relevant legal and administrative regulations such as raising the heights of bridges, retrofitting buildings, drainage and irrigation systems.
- 1.7 Declogging, reconditioning, rehabilitation and construction of drainage system.
- 1.8 Practice reforestation, forest restoration and afforestation using native tree species.
- 1.9 Rehabilitate wetland to regulate flow in watershed, thereby moderating floods from heavy rains and improving water quality.

Strategy #2:

- To build up/strengthen local disaster risk management capabilities (including clear responsibilities through provision of effective trainings on the causes, impacts and means of prevention of disasters)

Priority Actions #2:

- 2.1 Development of user-friendly manuals for design and construction of hazard-resistant houses in the selected vulnerable locations.
- 2.2 Training of masons and engineers to upgrade their skills in the construction of cost effective disaster resistant houses and in retrofitting features. Women construction workers would be encouraged to train as masons, and training sessions would ensure women's participation
- 2.3 Orientation of LGUs in proper land utilization

ACTION ARENA No. 3: DISASTER PREPAREDNESS

Preparation as main operational area intends to prevent or minimize deaths or other losses and damages in the case of an extreme natural event. Prior to the event it is necessary to prepare the institutions involved (above all disaster preparedness and civil protection, the fire department, the health service, administration, police) and the endangered population as to possible situations, and take precautionary steps.

Blocks (Constraints):

- Lack of reliable and updated information and sources (particularly on risk areas in the province).
- Lack of medicines, supplies and other equipments.
- Inactive BDCC.
- Disaster drills are taken for granted.
- Inadequate emergency hotlines/disaster related signages.
- Lack of knowledge on what to do during Disaster.
- Budgetary constraints on DRR mainstreaming in local development programs and policies.

Strategic Goals:

- Building an effective local disaster risk management system assuring the participation of all relevant social actors in the province.

Strategy #1:

- To institutionalize the system for disaster risk management in the PGLU

Priority Actions #1:

- 1.1 Prepare a Provincial Disaster Risk Reduction Framework serving as basis in the preparation of lower LGUs Disaster management Plans.
- 1.2 Formulation of Provincial Disaster Risk Management Plan with the adoption of participatory process to serve as road map in disaster management in the province.
- 1.3 Mainstreaming disaster risk reduction in the land use plan of the province and all LGU level comprehensive land use plans.
- 1.4 Preparation of a Provincial Communication Plan integrating DRR.
- 1.5 Supporting the PDCC for establishment of institutional, administrative, financial and legal systems to strengthen it as resource center for disaster risk management.
- 1.6 Formation of Disaster Management Working Committees (DMWC) – from the six areas of concerns- which would include all concerned government agencies/functionaries, basic sector organizations, volunteer groups, academe,

cadet corps, media, NGOs, community-based organizations (CBOs) and other civil society response groups.

- 1.7 Organization of BERT in every disaster prone barangay & provision of trainings.
- 1.8 Capacity building (training/coaching for skills) of functionaries at the provincial level to help them work with the local population both to develop a program for addressing local vulnerability as well as to develop their disaster response skills.
- 1.9 Conduct of 5-day hands-on training on DRR assessment.
- 1.10 Exposure visits to understand the best practices in the area of disaster risk management and sustainable recovery.

Strategy #2:

- To strengthen capacities at all levels in natural disaster risk management to ensure attainment of effective responses and sustainable recovery.

Priority Actions #2:

- 2.1 Consultations with local governments, NGOs, training institutions, private sector etc., for area specific disaster reduction and recovery strategies.
- 2.2 Training of all stakeholders on the process of development of community-based disaster risk management and response plans.
- 2.3 Design and production of Manuals for training and orientation of Disaster Coordinating Councils (DCCs) and Disaster Management Teams (DMTs) at all levels in dissemination of accurate warning, search and rescue operations, first aid, water & sanitation, shelter management, counseling and damage assessment for early response and recovery, proper utilization and better coordination of relief materials during crisis time. All manuals would address disaster response and recovery needs of special groups such as disabled persons, children, elderly people, pregnant women, etc.
- 2.4 Mobilize and train volunteers for effective response actions.
- 2.5 Building up and/or strengthening local disaster preparedness capabilities and rescue services - particularly, personnel and financial resources, logistics and
- 2.6 communications.
- 2.7 carrying out disaster preparedness exercises:
 - Disaster preparedness should be rehearsed, possibly through training and simulation exercises;
 - Disaster Response Mock drills at all levels (provincial, municipal, barangay levels).

Strategy #3:

- To formulate better communications and awareness-raising methodologies and strategies to ensure that disaster risk reaches end users and that communities and policy-makers are mobilized at all levels to initiate preventive action.

Priority Actions #3:

- 3.1 Formulation of specific awareness campaigns and strategies for implementation for disaster risk management in the selected areas (hazard specific Do's and Don'ts, checklist for preventive measures, etc.).
- 3.2 Awareness generation programs and activities through workshops/seminars/training, posters/leaflets, wall painting, and observation of disaster risk management day/week. At the municipal level,, community level level functionaries, extension workers, paramedicals and women volunteers would be used to organize the events.
- 3.3 Raising awareness in the population through information campaigns (e.g. radio or brochures) which can draw short-term attention to definite dangers and needed precautions (e.g. at the beginning of the rainy period), or promote acceptance for forthcoming preventive activities (e.g. a law on environmental protection or a vaccination campaign).
- 3.4 Development of school primers on disaster management, training of teachers in curricula, preparedness and response activities, mock drills in schools, etc.
- 3.5 Development of manuals for design and construction of hazard-resistant houses in the selected districts.
- 3.6 Development of user-friendly manuals for retrofitting, roof top rainwater harvesting features, etc.
- 3.7 Creating the most effective way to raise awareness by actively involving as many people as possible in implementing measures in the different operational areas of disaster risk management. This proceeds from the precept of motivating people on voluntary basis in order to:
 - build up a sufficient pool of informed and trained personnel for an emergency;
 - inculcate disaster risk management attitudes and behaviour in broad sectors of the population using the volunteers involved; and
 - ultimately strengthen the self-help capabilities of the endangered population.

ACTION ARENA No. 4: DISASTER RESPONSE

There should be a disaster emergency response plan, which considers local level plans. This will help maintain good interactions with the local level and provide the opportunity to support local departments in case of a disaster. The provincial level also needs to maintain good communications and coordination with other regional and national organizations. This will facilitate coordination of activities in the event of a disaster.

Blocks (Constraints):

- Not clear reporting details.
- Inadequate rescue equipments.
- Hesitance of families at risk to evacuate (particularly on post warning application).
- Identified evacuation centers not furnished to meet the evacuees' needs and requirements.

Strategic Goals:

- Coordinated & holistic response to address disaster emergency situations.

Strategy #1:

- To arrive for an effective and responsible response operations and actions during disaster occurrence

Priority Actions #1:

- 1.1 Strengthen the Provincial Disaster Operation Center (PDOC) with communication equipments and other requirements been installed.
- 1.2 Develop emergency response plan
- 1.3 All departments will identify in advance the tasks, which they will be expected to perform in major disasters and will prepare a detailed plan for emergency response. The personnel/teams will be identified to perform these tasks.
- 1.4 Identify current resources and capabilities available for mobilization contributory to an effective response actions.
- 1.5 Ensure the equipment/stores be kept and ready for mobilization at the request of the authority.
- 1.6 Ensure readiness of health facilities, services, manpower transport and supplies.
- 1.7 Presence of mechanism on sharing of informations from the lower level of LGU to the province and with the national vis-a-vis with the press on regular basis to prevent spread of rumors.
- 1.8 Building up of specialized local search and rescue teams with the technical support and assistance of national and local personnels.

Strategy #2:

- To effect responsive systematic relief operations that shall address the immediate need of calamity victims but not to continue for more than necessary period as to compromise the population social esteem.

Priority Actions #2:

- 2.1 Presence of action team that will undertake a quick estimate of damage assessment for assessing the relief requirements.

- 2.2 Develop the culture of coordination and deployment planning
 - identification of evacuation sites;
 - should have procedures in place for rapid procurement at the provincial level (or if possible, should establish relief stocks and equipment stocks near possible disaster sites) in order to give rapid assistance to remote local areas.
- 2.3 Involvement of evacuees in the operation and maintenance of the evacuation centers.
- 2.4 Improving abilities for rapid assessment of the requisite assistance as well as damage in the case of an emergency in order to ensure rapid and systematic delivery of needed assistance.
- 2.5 Adequate arrangement of security for the relief materials will be arranged.
- 2.6 Transparency in the entire relief operations will be maintained through participation of the media, community and local leaders. This is in simultaneous issuances of regular bulletins on information.

ACTION ARENA No. 5: RECOVERY AND REHABILITATION

Reducing disaster risk and improving other elements of risk management will not fully eliminate the need for humanitarian response to extreme events, particularly in more vulnerable communities. Thus, when local coping capacity is exceeded, it will need to be supported by national humanitarian assistance, such as the provision of medical aid, water, shelter, and other forms of technical and logistical supports. Major requirement is a detailed assessment of damages to be undertaken through respective Departments for taking up rehabilitation works as quickly as possible. A rehabilitation plan shall therefore be prepared.

Blocks (Constraints):

- Sourcing of:
 - ✓ Operational Funds
 - ✓ Manpower
 - ✓ Livelihood/Employment

Strategic Goals:

- To rehabilitate/ restore the normal function of the life of every individual

Strategy #1:

- Strengthening mechanisms for coordinating and delivering humanitarian assistance in time of need where people are given the opportunity to cope with climate-related extreme events.

Priority Actions #1:

- 1.1 Creation of validating teams from the Provincial Government to conduct actual and detailed assessment of damages subject for taking up rehabilitation works as quickly as possible.
- 1.2 A rehabilitation plan to be prepared through the participation of concerned offices with final copy submitted to the Office of the Governor.
- 1.3 The reconstruction phase after a disaster affords the opportunity to make use of experience gained with the latest natural events and it is also a time when the institutions and the population are particularly amenable to preventive approaches.
- 1.4 Need for proactive strengthening of mechanisms for coordinating and delivering humanitarian assistance in time of need
 - Relief supplies are quickly followed by protection and restoration of livelihood/employment - inputs for agricultural production, control of crop pest and animal diseases, repair of critical infrastructure (e.g. agri-infrastructures).
 - clearing operations.
 - rehabilitation of population - medical missions, etc.
- 1.5 Innovations will be needed to secure the additional resources required and to transparently account for these extra resources

ACTION ARENA No. 6: EFFECTIVE GOVERNANCE AND INSTITUTIONAL CAPACITIES

The success of disaster risk management efforts is critically dependent on political commitment manifested through good governance. Good governance includes the adoption and promotion of robust and sound policies, legislation, coordination mechanisms and regulatory frameworks, and the creation of an enabling environment that is characterized by appropriate decision making processes to allow effective participation of stakeholders, complemented by the appropriate allocation of resources. The local government units in the province are working now to mainstream disaster risk reduction into land use planning.

Furthermore, legislation is a critical component of disaster risk reduction, and calls upon States to “adopt, or modify where necessary, legislation to support disaster risk reduction, including regulations and mechanisms that encourage compliance to codes and that promote incentives for understanding risk reduction and mitigation activities”.

Moreover, enhanced coordination mechanisms will enable better identification of requirements, roles and responsibilities of various stakeholders in disaster risk reduction, and often lead to new partnerships to leverage capacities and resources of various agencies towards implementation of the DRM. This will further encourage participation of the population, the municipal administration and other institutions in all phases of disaster risk management.

Blocks (Constraints):

- Many LGUs have weak organizational and institutional capacities while others are not even aware of their DRR function.
- There was minimal exchange of information and experiences on DRR outside post-event activities.
- Most local officials do not put DRM as their major agenda, and such, subsequent efforts are bound to be stymied.
- Related laws and regulations pertaining to safety, mining, building code, land management, forestry, etc. are poorly enforced
- Although disaster management is a devolved function to LGUs, many LGUs, particularly the barangays, do not have a dedicated office to handle it

Strategic Goals:

- To enable the LGU to minimize losses of development gains from disasters and reduce vulnerability.

Strategy #1

- Establishing pro-active coordination mechanisms to address more effectively the decision process for disaster risk reduction thereby allowing full participation of stakeholders, complemented by the appropriate allocation of resources.

Priority Actions #1:

- 1.1 The DCC structure from the region to barangay needs to be revitalized and coordination mechanisms more clearly articulated.
- 1.2 Government acting as facilitators in organizing disaster management committees, formulation of community contingency plans, cooperation, coordination, networking, and linking solutions with the community needs and priorities.
- 1.3 New fora for government and civil society to openly discuss DRR issues and find solutions together shall be initiated.
 - A “Provincial Multi-stakeholder Dialogue on DRR”, to provide a venue for local, regional, and national (as well as international) players in DRR in which to exchange information and sound practices, take stock of progress and move forward;
 - These fora, however, should be institutionalized;
 - At the end of the conference, a Declaration of Commitment “to reduce the impacts of disasters...as part of good governance” shall be installed
- 1.4 Government budget must be secured for organizing at least one provincial forum yearly.
- 1.5 In the absence of a strengthened DRM focal organization, PDCC members should be called upon to collaborate in multi-stakeholder dialogues with broader group of stakeholders.
- 1.6 The Provincial Multi-stakeholder Dialogues ought to be continued in the spirit

of inclusiveness and mutual learning.

- 1.7 Advocacy roles should be undertaken by various stakeholders in order for the legislative bodies to legislate a new and more responsive DRM local laws and ordinances.