CHAPTER 5 EXISTING CONDITIONS OF FLOOD AND DISASTER MANAGEMENT IN BANGSAMORO

5.1 Floods and Other Disasters in Bangsamoro

5.1.1 Floods

(1) Disaster reports of OCD-ARMM

The Office of Civil Defense (OCD)-ARMM prepares disaster reports for every disaster event, and submits them to the OCD Central Office. However, historic statistic data have not been compiled yet as only in 2013 the report template was drafted by the OCD Central Office. OCD-ARMM started to prepare disaster reports of the main land provinces in 2014, following the draft template. Its satellite office in Zamboanga prepares disaster reports of the island provinces and submits them directly to the Central Office.

Table 5.1 is a summary of the disaster reports for three flood events in 2014. Unfortunately, there is no disaster event record of the island provinces in the reports for the reason mentioned above. According to staff of OCD-ARMM, main disasters in the Region are flood and landslide, and the two mainland provinces, Maguindanao and Lanao Del Sur are more susceptible to disasters than the three island provinces, Sulu, Balisan and Tawi-Tawi.

Table 5.1 Summary of Disaster Reports of OCD-ARMM for Three Flood Events

Disaster Event	Affected Municipalities	Casualties	Affected people	Damage to houses and infrastructures	Agricultural loss	Note
Flood in Maguindanao Province (June 13 to July 9, 2014)	Mamasapano, Datu Salibo, Shariff Saydona1, Datu Piang1, Sultan sa Barongis, Rajah Buayan1, Datu Abdulah Sangki, Mother Kabuntalan, Northern Kabuntalan, Ampatuan, Datu Montawal, Pagalungan, Datu Odin Sinsuat, Sultan Kudarat, General Salipada K. Pendatun (GSKP), Sultan Mastura, Mangudadatu, Buluan, Pandag, Talitay, Buldon, Barira	1 dead, No missing, No injured	32,001 families/ 160,005 individuals	No damage reported	PHP 43 million 8,303 ha affected. No reported livestock or fishery damage	State of Calamity was declared for Maguindanao Province on June 19 and released on June 23
Flash Flood in North Upi of Maguindanao Province (6/13–7/9/ 2014)	North Upi of Maguindanao	No Casualties	95 families/ 137 individuals	3 houses totally and 7 houses partially damaged.	2 ha of corn farm	No Declaration of State of Calamity
Flood in Maguindanao Province (August 25 to September 9, 2014)	Ampatuan, Buldon, Datu Montawal, Mamasapano, Pagalungan, Paglat, Shariff Saydona Mustapha, Sultan Kudarat, Sultan Mastura, Sultan Sa Barongis, North Upi, South Upi, Northern Kabuntalan, Mother Kabuntalan, Datu Salibo, Rajah Buayan, Datu Abdullah Sangki, Talitay, Magudadatu, Pandag, Buluan, General Salipada K. Pendatun (GSKP), Datu Piang, Datu Odin Sinsuat, Datu Hoffer, Talayan*	5 dead and 4 injured by flash flood and landslide in North Upi	35,930 families/ 176,355 individuals	11 houses totally damaged and 3 houses partially damaged. A primary school destroyed by landslide A number of properties were damaged due to tornado incident at Barangay Magsaysay, Parang Maguindanao	PHP 45 million 8,784 ha affected	A state of Calamity was declared for Kudarat Municipality on Sep. 9, for Kabuntalan Municipality on Sep. 8 and for Pagalungan Municipality on Aug. 29

Source: OCD-ARMM.

(2) Historical floods

Flooding in the Bangsamoro area is usually associated with the occurrence of typhoons, thunderstorms and/or monsoon rains. In particular, Typhoon Frank in 2008 triggered massive inundations in the provinces of Cotabato, South Cotabato and Sultan Kudarat (all in Region XII) and in the provinces of Lanao del Sur and Maguindanao (Figure 5.1). Table 5.2 shows flood damages in the BCT area according to the National Disaster Coordinating Council (NDCC—the forerunner of the National Disaster Risk Reduction and Management Council [NDRRMC]). In total, 46 people were killed, and

554,262 people of 490 barangays were affected.

According to officials of DPWH, the Simuay River changed its main course from west to south, namely to the Rio Grande de Mindanao (the Mindanao River) during the flood. This course change not only caused flooding over Sultan Kudarat Municipality of Maguindanao Province but also brought about siltation of sediments in the river channel of the Rio Grande de Mindanao. Moreover, water hyacinth flowing from the upstream was caught and accumulated at the New Delta Bridge and clogged the river channel. The siltation and the clogging raised the river water level, resulting in overflow into Cotabato City and Sultan Kudarat.

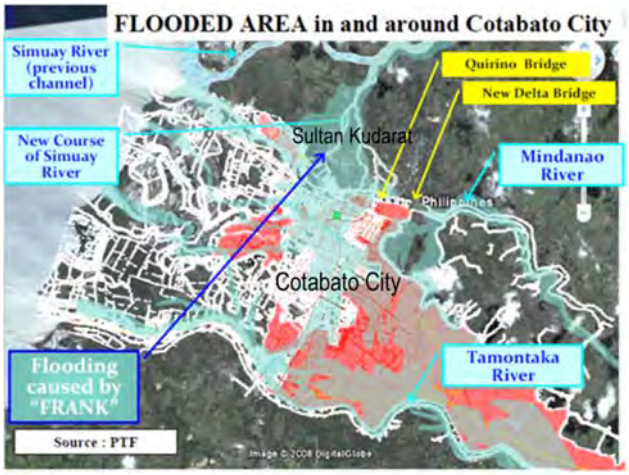
Table 5.2 Flood Damages in ARMM and Cotabato City by Typhoon Frank in 2008

Province/City	Population (as of August 2007)	No. of affected Barangays	Affected population (% of population)	No. of dead/missing
Maguindanao	1,273,725	279	311,379 (24.4%)	43
Lanao del Sur	1,138,544	176	138,693 (12.2%)	0
Tawi-Tawi	450,346	5	450 (0.1%)	0
Basilan	408,520	5	1,475 (0.4%)	0
Sulu	849,670	0	0 (0%)	0
Cotabato City	259,153	25	102,265 (39.5)	3
Total	4,379,948	490	554,262 (12.6%)	46

Source: NDDC-OCD.

In 2009 Typhoon Jolina displaced 15,000 families and inundated nearly all the barangays in Cotabato City (36 out of 37 barangays). For weeks, large tract of farmlands were submerged causing massive losses in agricultural productivity and income.

From May to June of 2011, moderately heavy rain caused massive flooding in 31 of the 37 barangays in Cotabato City, and seven municipalities of Maguindanao were under 5-feet of flood. In Lanao del Sur, inundation reached knee-deep in six municipalities. The Regional Disaster and Risk Reduction Management Council (RDRRMC) reported that about 75% of the houses and farmlands in Cotabato City and nearby environs were submerged for several weeks. Among those greatly affected were those in low-lying areas (floodplains) and near the major rivers of the Mindanao River Basin.



Source: NEDA Region XII.

Figure 5.1 Flood Areas around Cotabato City Caused by Typhoon Frank in 2008

Photo 5.1: Accumulation of water hyacinth under Delta Bridge on Rio de Grande River in June 2011

During the 2011 flood, water hyacinth became one of the most troublesome issues again. Accumulation of water hyacinth under the Delta Bridge and on the Tamontaka River contributed to the flood. The one under the Delta Bridge reached up to an estimated area of 16 ha, which was double its size three years ago during the onslaught of Typhoon Frank in 2008. As a solution of the water hyacinth problem, its utilization as materials for handicraft, feed, fertilizer, bio-energy, etc. is being promoted by the private sector in cooperation with DPWH and the LGUs.

Table 5.3 Natural Disaster Damages in ARMM between 2010 and 2011

Type of disaster	Date	Affected population	Affected areas
Flash Flood	June 2010	9,388 families 40,000 persons	Maguindanao Province (10 barangays)
Flash Flood	January 2011	11,816 families 59,080 persons	Maguindanao Province (26 barangays)
Flash Flood	February 2011	553 families	Sulu Province (4 coastal barangays)
Flood	May –June 2011	53,188 families 324,261 persons	Maguindanao Province (168 barangays)
Flood	May –June 2011	10,263 families 51,315 persons	Sulu (9 barangays)
Typhoon Sendong	December 15-16, 2011	27,357 families 138,504 persons	Maguindanao Province (15 barangays)

Source NDRRMC.

(3) Flood prone areas

Figure 5.2 shows the flood-prone area in the Bangsamoro region. The lowland area in Maguindanao along rivers such as the Mindanao River and the Simuay River, around Lake Lanao, and some parts of the coastline are flood prone areas.

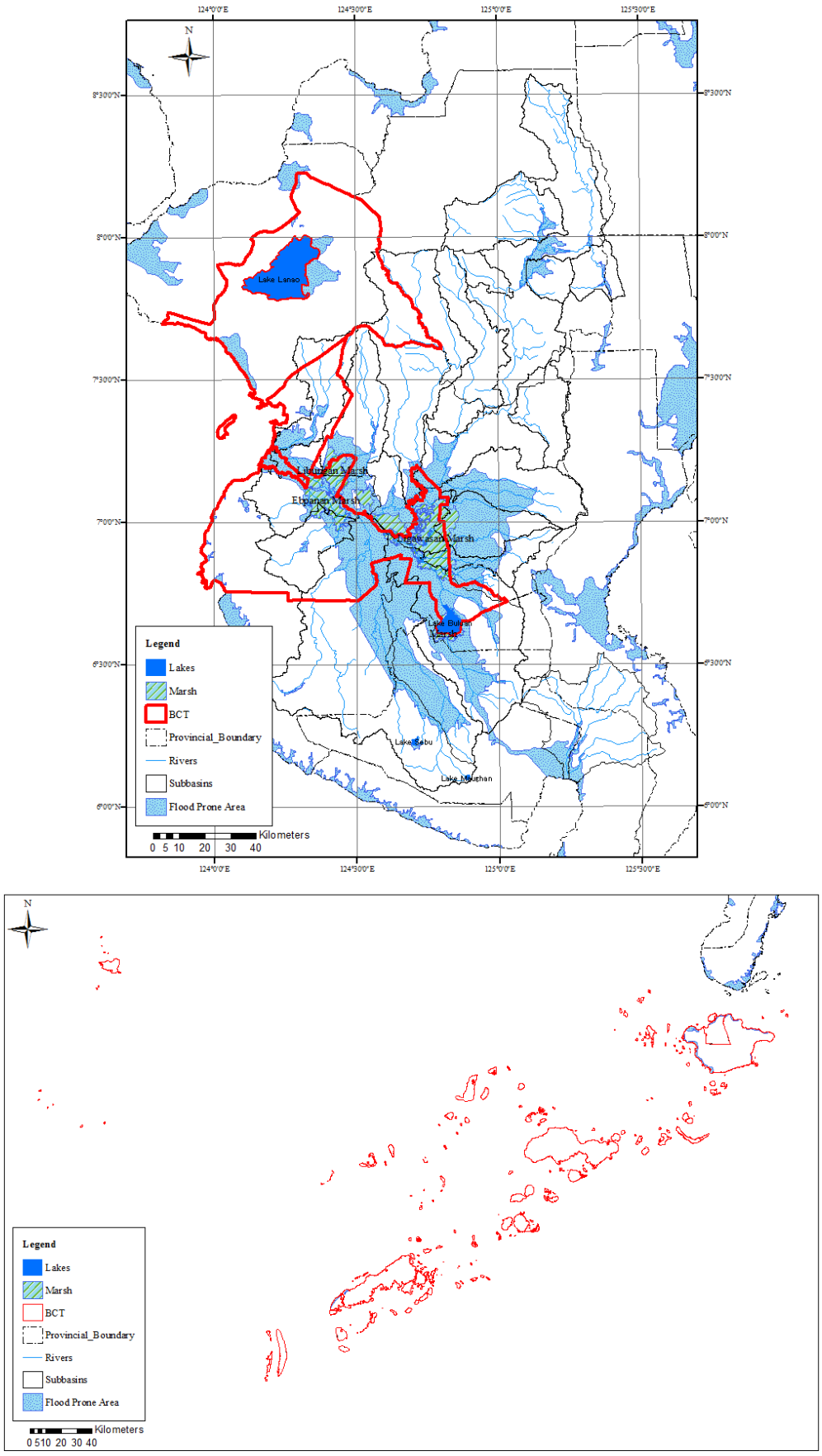
(4) Causes of flood

Conceivable causes of flooding in the Mindanao River Basin (MRB) might be summarized in Table 5.4, based on previous studies.

Table 5.4 Conceivable Causes of Flooding in Mindanao River Basin (MRB)

Cause of Floods	Contents
Poor flow capacity	Poor flow capacities of shallow, gentle and meandering river channels of the Mindanao River and its tributaries are one of the major cause of flooding.
Heavy erosion and siltation	Erosion is likely to occur due to the steep slope, no vegetation, and poorly consolidated or compacted sediments in the MRB. Eroded sediment is transported downstream and makes shallow the river beds.
River course change	Heavy erosion and siltation can even change river courses in the BCT area as the case of the Simuay River. Following is another example of the Allah River. The denuded upper mountains and hills in the Allah River basin, the pyroclastic materials from previous eruptions of Mt. Parker and the rich farmlands of Banga, Isulan, Tacurong, and Koronadal contribute to the major problem of siltation that has caused the perennial inundation of its flood plains where most of the populated centers and agricultural fields are located. The major storms of 2008 and 2009 have caused the river to change its course five times. In May 2011, the entire river diverted towards Barangay Tinumiguez at Lambayong, Sultan Kudarat and destroyed over 2,000 ha of rice field and flowed through a 4 km stretch of the Lambayong-Marbel road. In 2009, the diversion of the river course to the populated area of Lambayong imperiled the residents.
Water Hyacinth	The presence of water hyacinth (an indication of the poor water quality) which had been carried downstream from the Ligawasan Marsh caused the clogging of the Tamontaka River and the Rio Grande de Mindanao and consequently caused the great flood disaster in June 2011. The water hyacinth stretched nearly 8 km long and 5 m deep.

Source: JICA Study Team.



Source: Mines and Geosciences Bureau.

Figure 5.2 Flood Prone Area in Bangsamoro Region

5.1.2 Hazard maps

(1) Flood and landslide susceptibility

From the map shown in Figure 5.3, it can be observed that there is a huge extensive flood area along the Rio Grande de Mindanao (the lowest part of the Mindanao River) and in the marsh areas, and landside areas are also extensive in the south-western areas of Maguindanao and the western and south-western areas of Lake Lanao. It is also deemed that the island provinces are less disaster-prone than the mainland provinces except for flood areas around the coast of Sulu and landslide areas in Basilan.

Figure 5.4 is a flood area map of the 100-year return period prepared under the Mindanao River Basin Integrated Management and Development Master Plan (MRBIMDMP). Under the master plan study, flood area maps of 5, 10, 25 and 50-year return periods were also prepared. Recently more detailed flood hazard maps are being prepared by MGB and the Project NOAH as presented in Table sub-section 5.3.3. They are all based on high-resolution maps, and are expected to be more practically used for the disaster risk reduction and management.

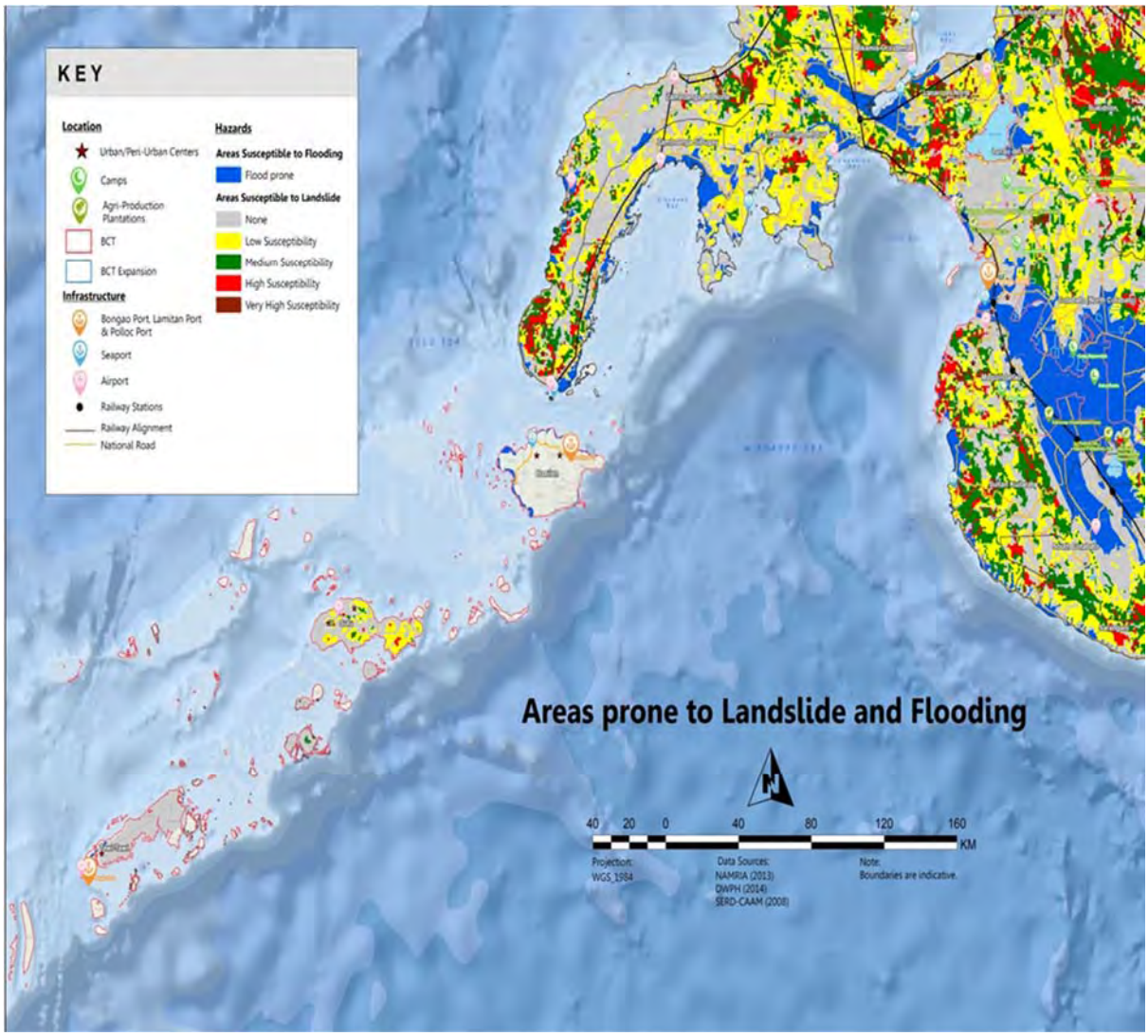


Figure 5.3 Flood and Landslide Susceptibility Map by MGB

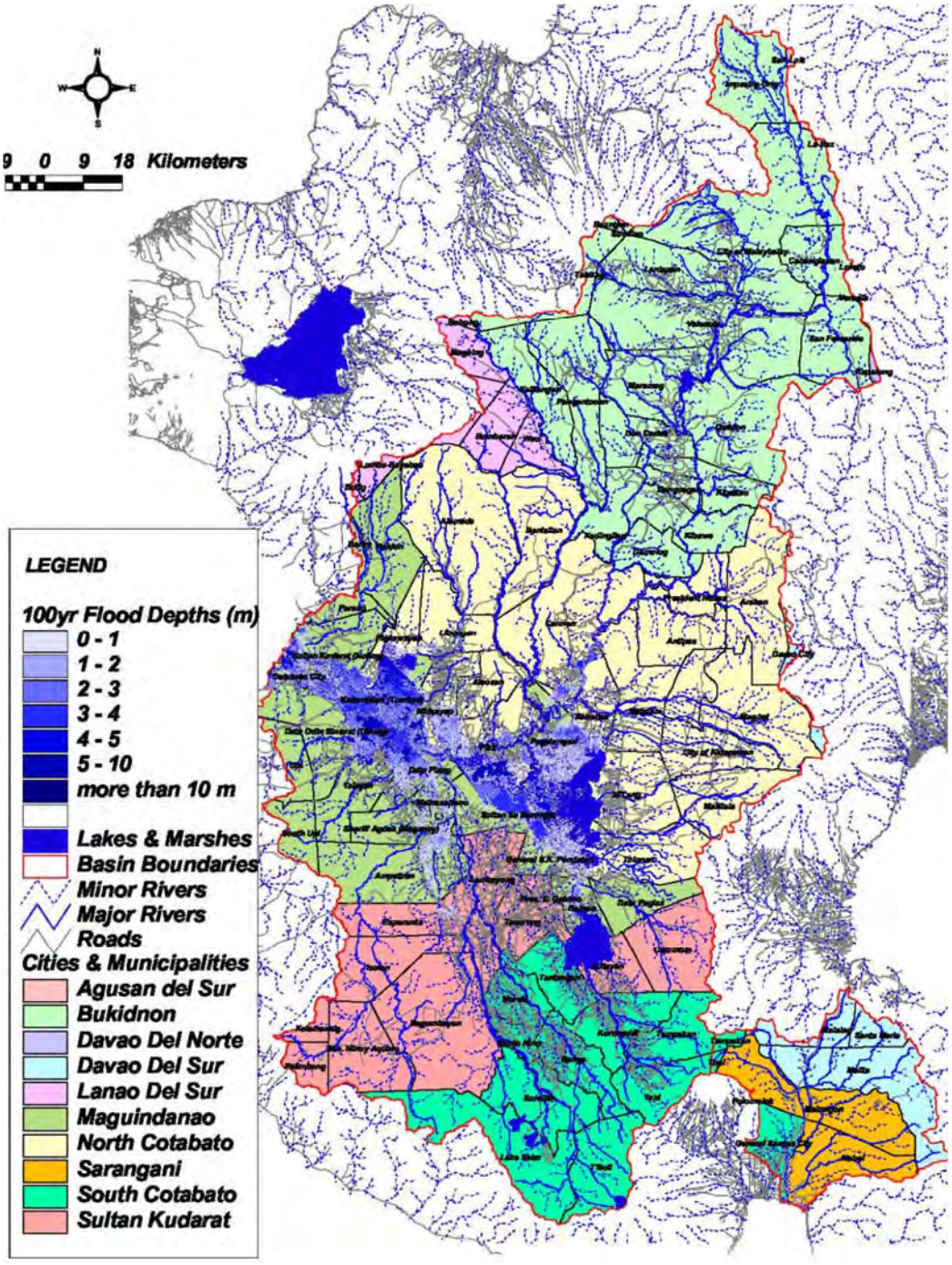


Figure 5.4 Flood Area Map by MRBIMDMP (100-year Return Period)

(2) Disaster susceptibility by municipality

Susceptibility to various disasters by municipality is assessed as summarized in Table 5.5.

Table 5.5 Susceptibility of Municipalities/Cities in MRB to Various Disasters

Province/City	No of Municipalities	No. of Municipalities/Cities Susceptible to Hazard										
		2-yr flooding	5-yr flooding	10-yr flooding	25-yr flooding	50-yr flooding	Rain-induced landslide	Earthquake	Earthquake-induced landslide	Liquefaction	Tsunami	Volcanic
Bukidnon	18	0	0	0	0	0	16	18	14	3	0	11
D. Del Sur	1	0	0	0	0	0	0	3	3	0	0	2
L. Del Sur	6	0	0	0	0	0	0	6	6	0	0	6
Maguindanao	19	14	14	14	14	14	3	11	11	13	3	2
Cotabato	18	12	12	12	12	12	0	16	16	12	0	7
Sarangani	2	2	2	2	2	2	1	2	2	1	1	2
S. Cotabato	11	0	0	0	0	0	0	7	7	7	0	7
S. Kudarat	10	3	3	3	3	3	3	7	7	7	0	2
Cotabato City	1	1	1	1	1	1	1	0	0	1	1	0
General Santos City	1	1	1	1	1	1	1	1	1	1	1	1

Source: MRBIMDMP.

5.1.3 Erosion and land slides

(1) Erosion

Figure 5.5 shows the erosion map in the Bangsamoro region. Erosion is likely to occur due to steep slopes, lack of vegetation cover, and poorly consolidated or compacted sediments. Moderate erosion happens mostly in Lanao del Sur. In most of the lowland area (in the Cotabato plain) in Maguindanao, no erosion is apparent. In the Tiruray upland located in southwestern Maguindanao, mostly moderate or severe erosions occur.

The Basilan and Sulu provinces have slight or mostly moderate erosion and a little severe erosion. The Tawi-Tawi Island has no apparent or slight erosion, generally.

Figure 5.6 shows the erosion area by province in the Mindanao River basin. The erosion in Maguindanao occupies only 11% and 12% in moderate and severe erosions, respectively. Most erosions in the Mindanao River basin exist in the upper Liguasan Marsh such as Bukidnon.

(2) Landslides

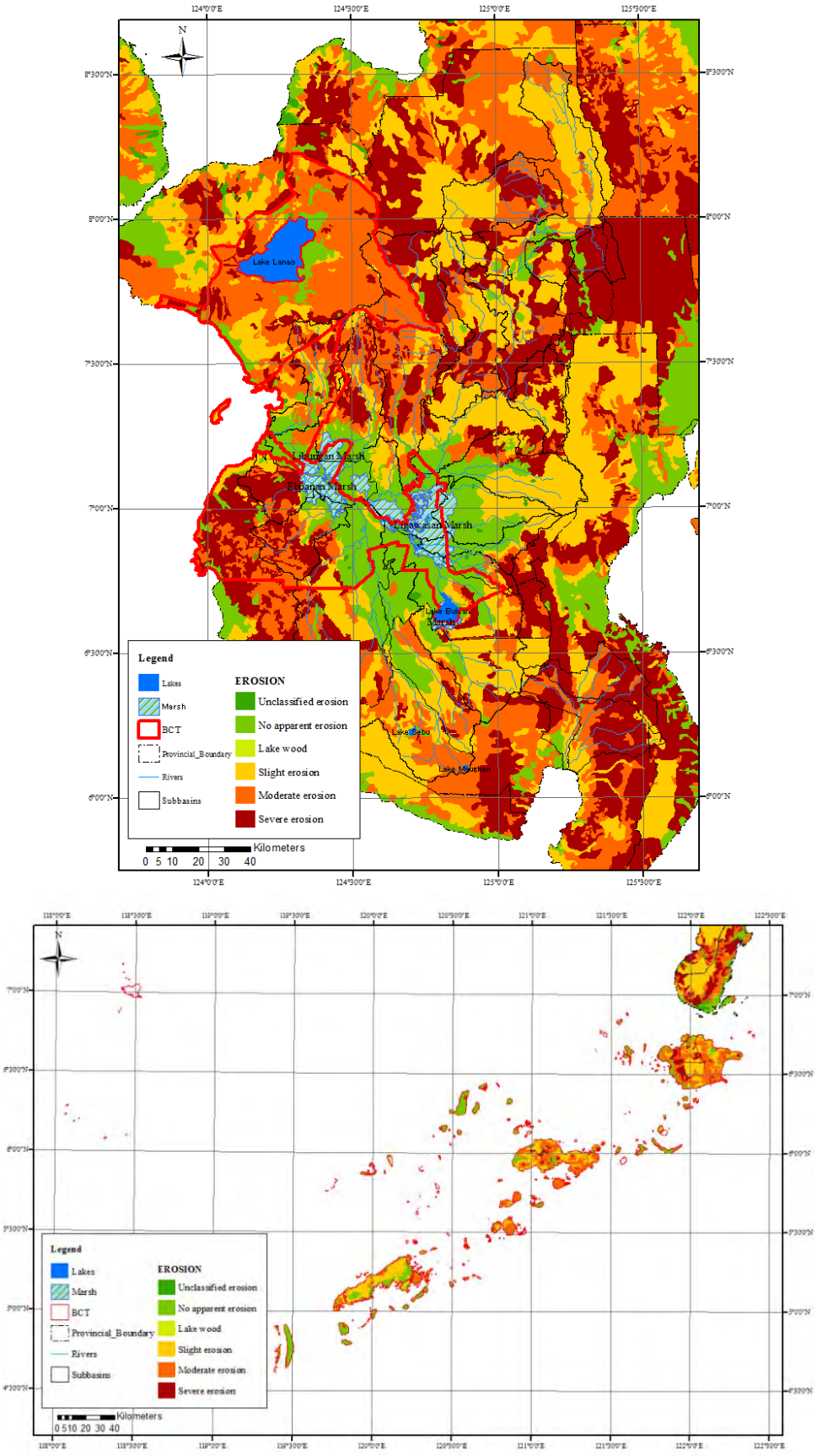
Figure 5.7 shows the earthquake-induced landslide susceptibility map in the Bangsamoro region. Most areas are classified as non-landslide susceptible. Mountain areas are classified as low, medium, high and very high landslide susceptible.

5.1.4 Earthquakes, liquefaction, tsunami and volcano eruption

(1) Geological faults

There are the Mindanao Fault and Lanao Fault System (Figure 5.7) near the Bangsamoro region. The Mindanao Fault trends NW-SE and is approximately more than 80 km north of Cotabato City. There is the Cotabato Trench in the southwestern offshore of Mindanao. Many earthquakes have been plotted along the Cotabato Trench.

Plate motions in the Philippines have been measured by the Global Positioning System (GPS) under the Project GEODYSSEA every two years since 1994. Less than 2 ± 0.15 cm/year westwards movement can be detected in Zamboanga as shown in Figure 5.8.



Source: Bureau of Soils & Water Management.

Figure 5.5 Erosion in Bangsamoro Region

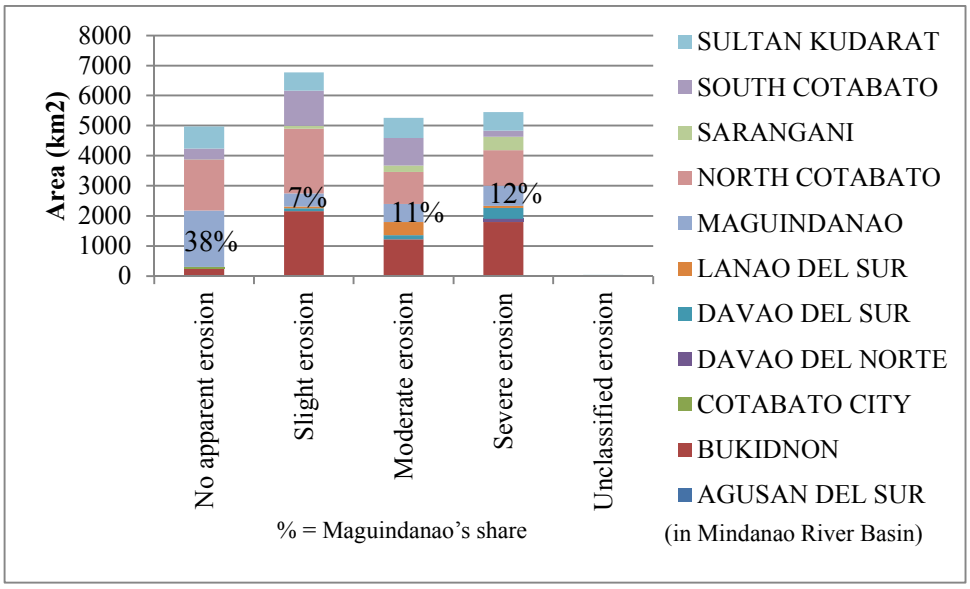


Figure 5.6 Erosion by Province in Mindanao River Basin

(2) Earthquakes and related disasters

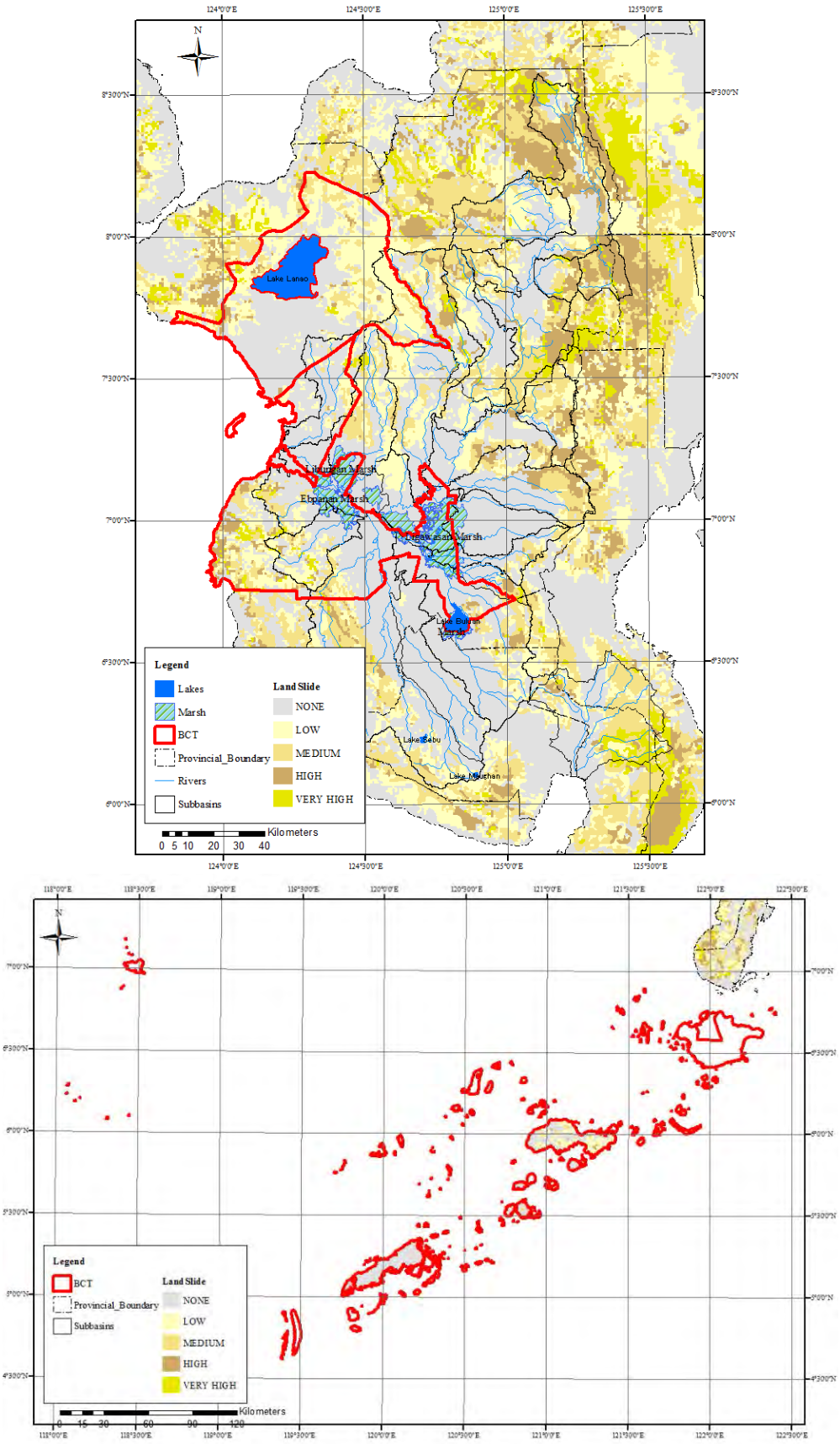
Many faults and trenches around the Bangsamoro region as shown in Figure 5.8 cause earthquakes and tsunamis. Epicenters are located around faults and trenches. The latest destructive earthquake occurred in 1976 and its epicenter was near the Cotabato Trench in the Moro Gulf. The magnitude was 7.9 in Richter scale. After the earthquake, a local tsunami hit the coastal area in the region and caused serious damages.

Tsunami risk areas are shown in Figure 5.9. Lanao del Sur, Maguindanao and Basilan are historically classified as high potential tsunami areas. Sulu and Tawi-Tawi are classified as potential tsunami areas (local generator). Earthquakes also cause liquefaction which is spread in lowland areas in Maguindanao and the coastal area as shown in Figure 5.9. The liquefaction phenomenon could be defined as saturated and unconsolidated sediments are changed to substances like liquid and causes serious damages.

There are also volcanoes around the Bangsamoro region as shown in Figure 5.9. Each volcano is defined as follows (Cited from PHIVOLCS):

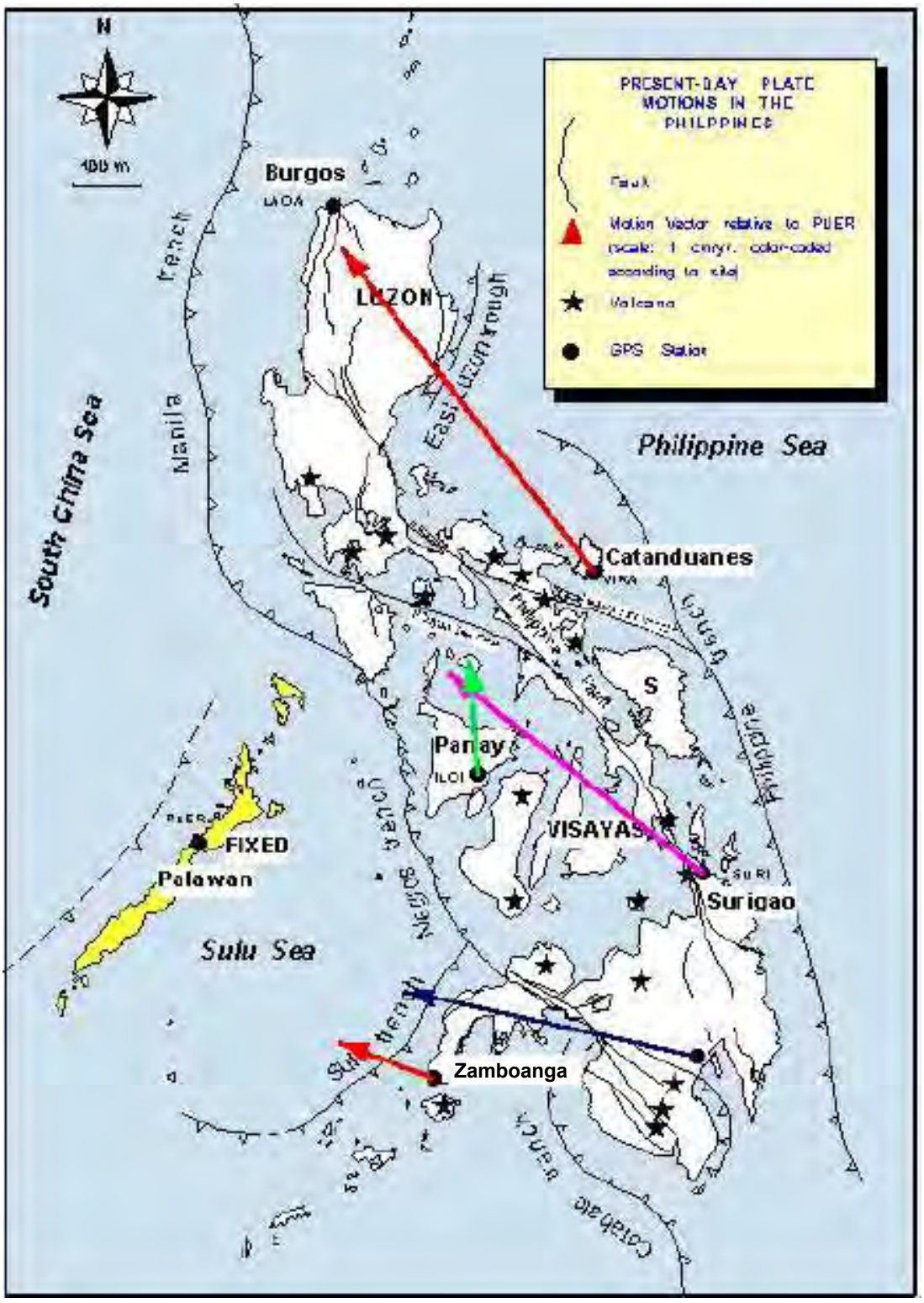
1) Active Volcanoes: erupted within historical times (within the last 600 years), accounts of these eruptions were documented by man; erupted within the last 10,000 years based on analyses of datable materials.
2) Potentially Active Volcanoes: morphologically young-looking but with no historical records of eruption.
3) Inactive Volcanoes: no record of eruptions; physical form is being changed by agents of weathering and erosion via formation of deep and long gullies.

There are five volcanic complexes within and around the Bangsamoro region, namely; (a) Lanao Volcanic Complex; (b) Ragang Volcanic Complex; (c) Mt. Parker Volcano; (d) Mt. Matutum Volcano Complex; and (e) Mt. Dajoh (MRBIMDP, 2012; PDPFP Sulu, 2013).



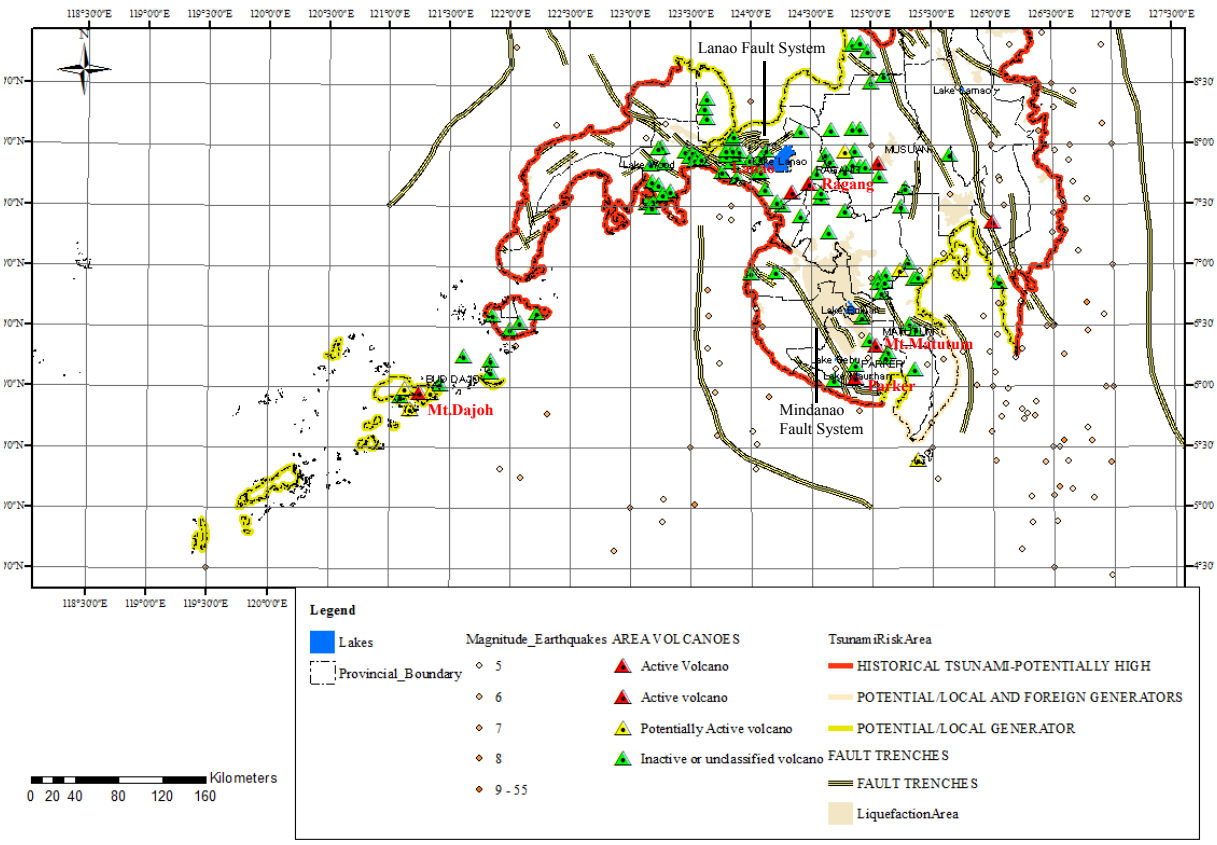
Source: Philippine Institute of Volcanology and Seismology (PHIVOLCS).

Figure 5.7 Landslide Susceptibility in Bangsamoro Region



Source: Geology And Mineral Resources of the Philippines, Vol.1, Revised Edition 2004.

Figure 5.8 Plate Motions in the Philippines



Source: Philippine Institute of Volcanology and Seismology (PHIVOLCS).

Figure 5.9 Earthquakes and Related Disasters in Bangsamoro Region

5.1.5 Climate change, El Nino, and droughts

(1) Climate change

The impact of climate change is a common concern of all mankind, but the situation is more serious for the Philippine people, who have been hit so often recently by extreme flood catastrophes, Tropical Strom Ondoy in 2009, Typhoon Pablo and Tropical Storm Sendong in 2012, and Typhoon Yolanda in 2013, etc.

Box 1 presents climate projections in 2020 and 2050 for the mainland provinces of ARMM by PAGASA. Box 2 is an extract on Asia Region from the Chapter 24 of *Impact, Adaptation and Vulnerability: Climate Change 2014* by the Working Group II of IPCC. According to them, the frequency of extremely heavy rainfall will increase, and precipitation will likely be more extreme near the centers of tropical cyclones making landfall and future increases in precipitation extremes related to the monsoon are also very likely. Therefore, rain-induced hazards such as flood and landslide will likely increase in the future.

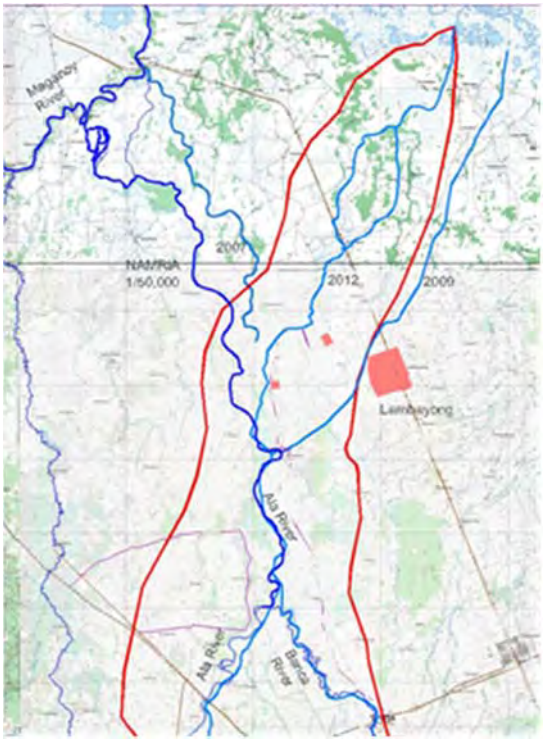


Figure 5.10 River Course Change of Allah River

Box 5.1: Climate Projections in 2020 and 2050 in Provinces in ARMM by PAGASA

The projected seasonal temperature increase, seasonal rainfall change and frequency of extreme events in 2020 and 2050 under the medium-range emission scenario in the provinces in ARMM are presented in Table a, Table b and Table c, respectively.

Table a: Seasonal temperature increases (in °C) in 2020 and 2050 under medium-range emission scenario in provinces in ARMM

	OBSERVED BASELINE (1971-2000)				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
ARMM												
LANAO DEL SUR	24.3	25.4	25.0	24.9	1.0	1.2	1.1	1.0	2.0	2.3	2.2	2.0
MAGUINDANAO	27.6	28.3	27.5	27.6	1.0	1.2	1.2	1.1	2.1	2.3	2.4	2.1

Table b: Seasonal rainfall change (in %) in 2020 and 2050 under medium-range emission scenario in provinces in ARMM

	OBSERVED BASELINE (1971-2000)				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
ARMM												
LANAO DEL SUR	293.8	369.4	661.5	562.2	7.2	-6.3	-7.2	0.3	-1.1	-4.6	-7.4	-3.6
MAGUINDANAO	225.3	399.1	635.3	553.6	6.3	1.4	-7.4	3.5	5.3	-1.4	-12.6	-1.2

Table c: Frequency of extreme events in 2020 and 2050 under medium-range emission scenario in provinces in ARMM

Provinces	Stations	No. of Days w/ Tmax >35 °C			No. of Dry Days			No. of Days w/ Rainfall >300mm		
		OBS	2020	2050	OBS	2020	2050	OBS	2020	2050
MAGUINDANAO	Cotabato	384	3382	5994	3516	5471	5788	0	3	1

Source: http://pagasa.dost.gov.ph/index.php/component/content/category/116-climate-change-in-the-philippines

Box 2: Projected Climate Change for Asia Region quoted from IPCC 5th Assessment Report

24.3.2. Projected Climate Change

24.3.2.1. Tropical and Extra-tropical Cyclones

The future influence of climate change on tropical cyclones is likely to vary by region, but there is low confidence in region-specific projections of frequency and intensity. However, better process understanding and model agreement in specific regions indicate that precipitation will likely be more extreme near the centers of tropical cyclones making landfall in West, East, South, and Southeast Asia (see WGI AR5 Sections 14.6, 14.8.9-12). There is medium confidence that a projected poleward shift

in the North Pacific storm track of extra-tropical cyclones is more likely than not. There is low confidence in the magnitude of regional storm track changes and the impact of such changes on regional surface climate (see WGI AR5 Section 14.6).

24.3.2.2. Monsoons

Future increases in precipitation extremes related to the monsoon are very likely in East, South, and Southeast Asia (see WGI AR5 Sections 14.2.1, 14.8.9, 14.8.11-12). More than 85% of CMIP5 models show an increase in mean precipitation in the East Asian summer monsoons, while more than 95% of models project an increase in heavy precipitation events (see WGI AR5 Section 14.2.2, Figure 14.4). All models and all scenarios project an increase in both the mean and extreme precipitation in the Indian summer monsoon (see WGI AR5 Section 14.2.2 and Southern Asia (SAS) in Figure 14.4). In these two regions, the inter-annual standard deviation of seasonal mean precipitation also increases (see WGI AR5 Section 14.2.2).

Source: Chapter 24, *Impact, Adaptation and Vulnerability: Climate Change 2014*, by IPCC Working Group II.

(2) El Nino and droughts

A drought often occurs with El Niño which is the warm phase of El Niño Southern Oscillation (ENSO). ENSO is a phenomenon identified with the decrease of sea surface temperature of tropical zone in the western Pacific Ocean, and it causes inactive cloud activities. As a result, the amount of rainfall decreases near the Philippines. The droughts that occurred in 1999, 2004, 2007 and 2010 were due to El Niño.

A drought often occurs with El Niño which is the warm phase of El Niño Southern Oscillation (ENSO).

ENSO is a phenomenon identified with the decrease of sea surface temperature of tropical zones in the western Pacific Ocean, and it slows down cloud growth and activities. As a result, the amount of rainfall decreases near the Philippines and brings droughts that impact agriculture, water supply and hydropower. Also, there are impacts on environment and natural resources such as high forest fire risk and degradation in soil and forest. Figure 5.11 shows the risk to El Niño induced drought. The Bangsamoro region is classified as *high* to *very high* risk area for the effects of El Niño.

The droughts that occurred in 1999, 2004, 2007, and 2010 were due to El Niño. Especially, the 1997/1998 El Niño that brought severe drought was among the strongest on record to date and resulted in 74 people dead and 500,000 families faced food insecurity. The primary concern with El Niño is food security. Prolonged droughts and long dry spells due to El Niño cut down harvest and affect fishery production due to change in the lake temperature. In case of 2010 drought, monkeys moved out from sanctuaries and it affected to tremendous loss of tourism.

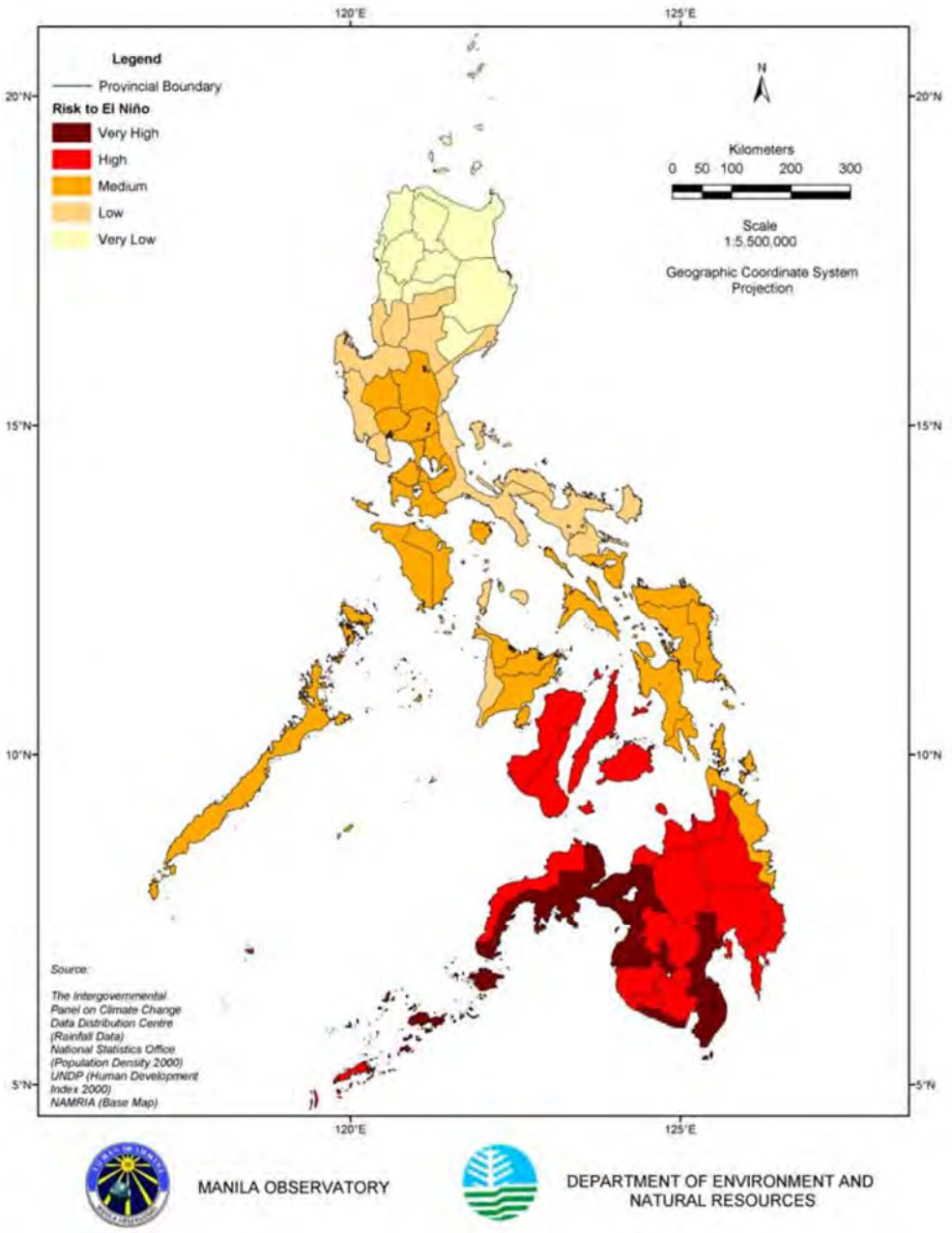


Figure 5.11 Classification of Risks to El Niño Induced Drought

5.2 Disaster Risk Reduction and Management

5.2.1 Disaster risk reduction system

(1) Republic ACT 10121

In response to the phenomenon of disasters and extreme events, the Philippines passed a major legislation: Philippine Disaster Risk Reduction and Management Act of 2010 or RA 10121. This act aims to transform the Philippines' Disaster Management System from Disaster Relief and Response towards Disaster Risk Reduction and Management (DRRM). The National Disaster Risk Reduction and Management Council (NDRRMC) has been given the mandate to craft and implement the National DRRM Framework and Plan which utilizes the multi-hazard approach in managing the impact of natural and human-induced disasters.

RA 10121 supersedes the three-decade old Presidential Decree (PD) 1566, which established the National Disaster Coordinating Council (NDCC) and previous disaster risk management system in the country, which was primarily focused on post-disaster response. In adherence to the Philippine Constitution and to international commitments, RA 10121 calls for the development of a National DRRM Framework which provides for a "comprehensive, all-hazards, multi-sectoral, inter-agency, and community-based approach to disaster risk reduction and management."

RA 10121 promotes a holistic approach to minimize the socio-economic and environmental impacts of disasters and to mainstream DRRM and CCA in to development processes. It encourages the involvement and participation of local communities, civil society organizations (CSOs), private sector, and volunteers to utilize their resources and facilities for the protection of life and preservation of properties.

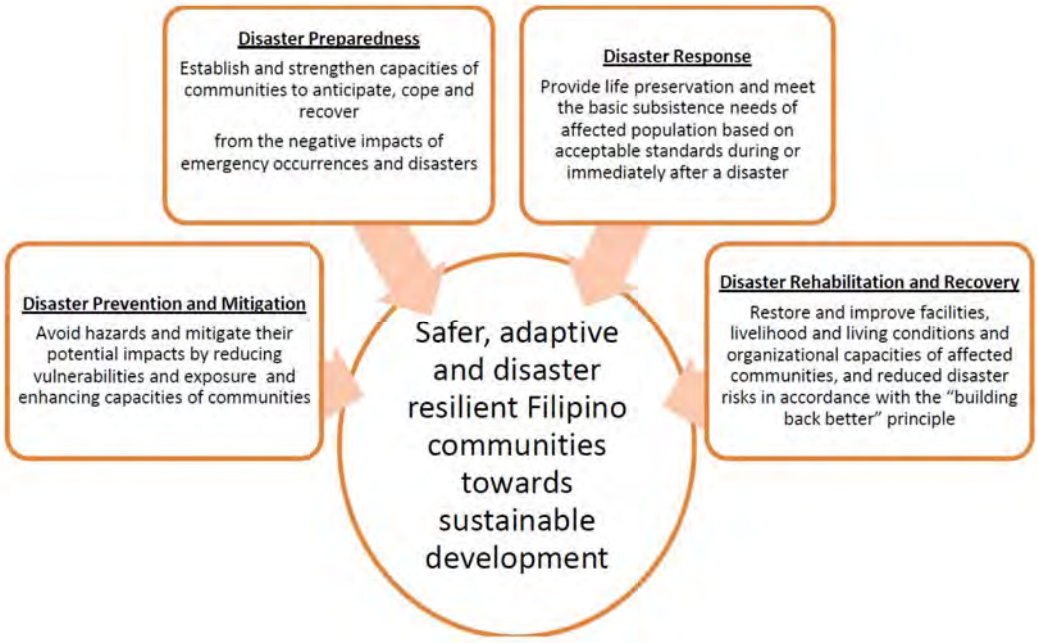
RA 10121 has several salient provisions that underpin the long-term resilience of the Philippines to natural hazards. In terms of participation of stakeholders, the law expanded the membership of the National DRRM Council (NDRRMC) from the former NDCC set-up which was mainly composed of the government's line departments. The NDRRMC is now composed of a Chairperson, four Vice-Chairpersons, and 39 members including representatives of four CSOs and one from the private sector as shown Figure 5.12. Corresponding to the NDRRMC at the national level, DRRMCs were also organized at the Regional, Provincial, City and Municipal levels.

Another salient provision is the establishment of permanent Local DRRM Offices in every province, city, and municipality. The primary mandate of the Local DRRM Offices is to set the direction, development, implementation, and coordination of DRRM programs within their territorial jurisdictions.

Under RA 10121, the former Local Calamity Fund under PD 1566 is now known as the Local DRRM Fund (LDRRMF). Not less than 5% of the estimated revenues from regular sources will be set aside as the LDRRMF to support DRRM activities such as pre-disaster preparedness programs including training, purchasing life-saving rescue equipment, supplies, and medicines; post-disaster activities; and payment of premiums on calamity insurance. Of the amount appropriated for LDRRMF, 30% will be allocated as Quick Response Fund (QRF) or stand-by fund for relief and recovery programs in order that situation and living conditions of people in communities or areas stricken by disasters, calamities, epidemics, or complex emergencies, may be normalized as quickly as possible.

(2) National DRRM Plan (NDRRMP) 2011–2028

The National Disaster Risk Reduction and Management Plan (NDRRMP) fulfills the requirement of RA 10121 of 2010, which provides the legal basis for policies, plans and programs to deal with disasters. The NDRRMP covers four thematic areas, namely, 1) Disaster Prevention and Mitigation; 2) Disaster Preparedness; 3) Disaster Response; and 4) Disaster Rehabilitation and Recovery, which correspond to the structure of the National Disaster Risk Reduction and Management Council (NDRRMC). For each thematic area a lead agency is designated as shown in Table 5.6. OCD is responsible for not only implementing the NDRRMP but also ensuring that the physical framework, social, economic and environmental plans of communities, cities, municipalities and provinces are consistent with such plan.



Source: NDRRMP 2011–2018.

Figure 5.12 Four Thematic Areas of Philippine DRRM System

Table 5.6 Lead Agency, Outcome and Key Result Areas of Each Area of DRRM System

Area	Lead agency	Outcome	Key result area
Prevention and Mitigation	DOST	Avoid hazards and mitigate their potential impacts by reducing vulnerabilities and exposure and enhancing capacities of communities	- Mainstreamed and integrated DRR & CCA in national, sectoral, regional and local development, policies, plans and budget. - DRRM/CCA sensitive environmental management. - Increased disaster resiliency of infrastructure systems. - Community based and scientific DRR/CCA assessment, mapping, analysis and monitoring. - Risk transfer mechanisms
Preparedness	DILG	Establish and strengthen capacities of communities to anticipate, cope and recover from the negative impacts of emergency occurrences & disasters	- Community Awareness and understanding of the Risk Factors - Contingency Planning at the local level (to include Incident Command System, Early Warning Systems, Pre-emptive evacuation, stockpiling and equipping) - Local drills and simulation exercises - National disaster response planning
Response	DSWD	Provide life preservation and meet the basic subsistence needs of affected population based on acceptable standards during or immediately after a disaster	- Damage and needs assessment - Relief Operations - Search, Rescue, Retrieval - Dissemination/Information sharing of disaster-related information - WATSAN and Health - Development/provision of temporary shelter - Psycho social support - Early Recovery Mechanism - Management of Dead and Missing - Evacuation Management - Social Protection Intervention - Civil and uniformed services coordination
Rehabilitation & Recovery	NEDA	Restore and improve facilities, livelihood and living conditions and organizational capacities of affected communities, and reduced disaster risks in accordance with the "building back better" principle	- Livelihood - Shelter - Infrastructure

Source: NDRRMP 2011–2028.

(3) Regional DRRM Plan 2012–28

In accordance with the NDRRMP, the ARMM Regional Disaster Risk Reduction and Management Plan (RDRRMP) 2012–2018, were prepared to provide local authorities with ready options and priorities for

action. Disaster risk reduction and management can be highly effective on when local authorities integrate DRRM measures and objectives in various aspects of local governance functions, responsibilities, and practices. This includes the systematic consideration of risk and risk reduction strategies and plans in ARMM, such as regional development plans, food security and related human security strategies, environmental management strategies, integrated water resource management plans, and integrated coastal zone management plans.

This ARMM RDRRMP intends to provide local government units with the knowledge and capacity necessary to effectively comply the RA 10121, which requires the establishment of Local Disaster Risk Reduction and Management (LDRRM) Office in every province, city, and municipality; and a LDRRM Plan, implemented together with local partners and stakeholders.

The outline of the ARMM RDRRMP is summarized in Table 5.7. For the four thematic areas a total of 24 outputs are proposed. According to the implementation timeline of the RDRRMP, all the activities of the 24 outputs will be 100% completed by 2028. OCD-ARMM and ORG/TMS-ARMM are to submit to the Office of the ARMM Regional Governor through the Executive Secretary and ARMM Regional Legislative Assembly (RLA), within the first quarter of the succeeding year, an annual report relating to the progress of the implementation of the RDRRMP as part of the monitoring and evaluation system.

5.2.2 DRRM practices

Since the RA 10121 was promulgated in January 2010 the DRRM system has been developed nation-widely. Notwithstanding, the level of implementation and enforcement of the new system seems to still remain at its infantile stage.

Under the Mindanao River Basin Integrated Management and Development Master Plan study, key-informant interviews were conducted with local heads from July to August of 2010. The results disclosed that risk information had been hardly available at the local level, early warning systems and protocols on response were not clearly established. Only twelve of the forty municipalities (30%) interviewed were able to provide copies of their respective preparedness and contingency plans. These, however, were either outdated or at the proposal stage. None had been approved by their respective local councils for appropriation. Table 5.8 provides a summary checklist of selected LGU disaster management plans.

The aforementioned information may be already too old as the interviews were made in 2010. A JICA capacity development project, Autonomous Region in Muslim Mindanao (ARMM) Human Resource Development Project, was implemented between May 19, 2008 and March 31, 2011. Staff members of DPWH-ARMM were trained in skills of flood control study under the infrastructure development course of the project. Therefore, some of improvement might have been made in this aspect at least.

As described in the Final Report of the Disaster Risk Reduction and Management Capacity Enhancement Project (DRRMCEP) of JICA dated March 2015, the percentage of LGUs that have submitted their Local DRRM Plans was only 50% for ARMM as of December 2014, the lowest among the 16 regions of which average was 90%. DOST-ARMM, DILG-ARMM and DSWD-ARMM and RPDO-ARMM, which are the lead agencies for the four thematic fields, Prevention and Mitigation, Prepared-ness, Response and Rehabilitation & Recovery respectively, do not grasp the progress of activities of the LGUs very well. As for the establishment of the Regional DRRM Office (RDRRMO) and the Humanitarian Emergency Action response Team (HEART), there may be still some lacking in the capacity building efforts aside from the numerous training workshops and drills that are being implemented by the OCD-ARMM.

Officials of OCD-ARMM were interviewed by the JICA Study Team about issues toward the improvement of the present DRRM system. The OCD-ARMM officials pointed out the following issues that should be dealt with immediately.

1) Poor knowledge of local people on disasters (for example most of local people do not understand storm surge)
2) Poor consideration of disaster risk in land-use planning
3) Dependence of DRRM activities at local levels upon the awareness of the municipal mayor

Table 5.7 ARMM Regional DRRM Plan

Area	Lead agency	Goal	Objectives	Outcomes	Lead agency
Prevention and Mitigation	DOST-ARMM	Avoid hazards and mitigate their potential impacts by reducing vulnerabilities and exposure and enhancing capacities of communities in the ARMM	Reduce vulnerability and exposure of communities to all hazards Enhance capacities of communities to reduce their own risks and cope with the impacts of all hazards	DRRM and CCA mainstreamed and integrated in regional, sectoral and local development policies, plans and budget	OCD-ARMM and ORG/TMS-ARMM
				DRRM and CCA-sensitive environmental management	DENR-ARMM
				Increased disaster resilience of infrastructure systems	DPWH-ARMM
				Community based and scientific DRRM and CCA assessment, mapping, analysis and monitoring are conducted and/or improved	OCD-ARMM & ORG/TMS-ARMM
				Communities have access to effective and applicable disaster risk financing and insurance	FBMS/ ORT-ARMM
				End-to-End monitoring system (monitoring and response), forecasting and early warning are established and/or improved	DOST-ARMM
Preparedness	DILG-ARMM	Establish and strengthen capacities of communities to anticipate, cope and recover from the negative impacts of emergency occurrences & disasters in the ARMM	Increase the level of awareness of the community to the threats and impacts of all hazards, risks and vulnerabilities Equip the community with the necessary skills to cope with the negative impacts of a disaster Increase the capacity of institutions Develop and implement comprehensive regional and local disaster preparedness policies, plans and systems Strengthen partnership among all key players and stakeholders Optimize utilization of capacity-building resources and match with the needs of the LGUs	Increased level of awareness and enhanced capacity of the community to the threats and impacts of all hazards	BPI-ARMM
				Communities are equipped with necessary skills and capability to cope with the impacts of disasters	DILG-ARMM /& OCD-ARMM
				Increased DRRM and CCA capacity of Local DRRM Councils and Offices	DILG-ARMM
				Developed and implemented comprehensive regional and local preparedness and response policies, plans, and systems	DILG-ARMM and OCD-ARMM
				Strengthened partnership and coordination among all key players and stakeholders	DILG-ARMM
Response	DSWD-ARMM	Provide life preservation and meet the basic subsistence needs of affected population based on acceptable standards during or immediately after a disaster in the ARMM	Decrease the number of preventable deaths and injuries Provide basic subsistence needs of affected population Immediately restore basic social service	Well-established disaster response operations	DSWD-ARMM
				Adequate and prompt assessment of needs and damages	OCD-ARMM and DSWD-ARMM
				Integrated and coordinated Search, Rescue and Retrieval (SRR) capacity	OCD-ARMM, DILG-ARMM, and DOH-ARMM
				Evacuated safely and on time affected communities	LGUs
				Temporary shelter needs are adequately addressed	DSWD-ARMM
				Basic health services provided to affected population whether inside or outside ECs	DOH-ARMM
				Psychosocial well-being promoted and mental health problems and risks reduced	DOH-ARMM
				Coordinated, Integrated System for Early Recovery implemented on the regional and local levels	DSWD-ARMM
Rehabilitation & Recovery	RPDO-ARMM	Restore and improve facilities, livelihood and living conditions and organizational capacities of affected communities, and reduced disaster risks in accordance with the "building back better" principle	Restore people's means of livelihood and continuity of economic activities and business Restore shelter and other buildings/installation Reconstruct infrastructure and other public utilities Assist in the physical and psychological rehabilitation of persons who suffered from the effects of disaster	Damages, Losses and Needs Assessed	OCD-ARMM and ORG/TMS-ARMM
				Economic activities restored and, if possible, strengthened or expanded	PRDO
				DRRM/CCA elements incorporated in human settlement	HLURB-ARMM
				Disaster and climate change-resilient and infrastructure reconstructed	DPWH-ARMM
				A psychologically sound, safe and secured citizenry that is protected from the effects of disasters able to restore to normal functioning after each disaster	DOH-ARMM and DSWD-ARMM

Source: ARMM Regional DRRM Plan.

Table 5.8 Summary of Checklist of Selected LGUs in MRB

Indicator No.	Province/City	Maguindanao	Maguindanao	S. Cotabato	S. Cotabato	S. Cotabato	Sultan Kudarat	Sarangani	General Santos City	Sarangani	Buukidon	Bukidon	Sultan Kudarat
	Municipality/City	Buluan*	Datu Paglas*	Koronadal City	Tampakan	Tupi	Bagumbayan	Alabel		Malungon	Maramag	Malaybalay City	Esperanza
1	Preparedness												
1.1	Vulnerability Assessment			++	++	++	++				+	++	
1.2	Planning	+	+	++	++	++	+	++		++	++	++	
1.3	Institutional framework		+	++	++	++	++	++	++			++	+
1.4	Information System				++								
1.5	Resource base		+	++	++	++		++			++		
1.6	Warning systems			++			++		++		++		
1.7	Response mechanism		+	++		++		++					
1,8	Public education training			++	++	++		++	++		++	++	
1.9	Rehearsals												
2	Mitigation												
2.1	Engineering			++									
2.2	Spatial Planning	+											
2.3	Economic												
2.4	Management and institution			++			++						
2.5	Societal												
2.6	Conflict resolution					++		++					
2.7	Timing												
2.8	Political												
2.9	Long-term development efforts			++			++					++	
3	Reconstruction and rehabilitation												
3.1	Damage assessment			++	++	++					+		
3.2	Capacities assessment			+	++		++	++					
3.3	Institutional arrangement			+					++				
3.4	Income generation activities												
3.5	Community organization	+		++	++	++	++	++					
3.6	Capital resources										++		
3.7	Planning/phasing of activities					++		++					
3.8	Timing												
3.9	Emergency settlement	+		++				++					
4.	Response												
4.1	Protocol			++									
4.2	Quick response mechanism								++				
4.3	Relief resources	+									++		

Note: + Mentioned in general term; ++ Specific activities identified; +++ With concrete programs/projects with funding/approved by Sanggunian; ++++ Links risk assessment to planning and with approved budget; Not present if not indicated; * located in BCT area.

Source: MRBIMDMP.

5.3 Ongoing and Proposed Flood Control Projects

To cope with flood problems described in the previous chapter, the Government of Philippines has been making efforts by implementing flood control and DRRM projects/programs. The following are underway and proposed ones in the Mindanao River Basin Integrated Management and Development Master Plan (MRBIMDMP) and the Integrated River Basin Management and Development Master Plan for Ranao (Agus) River Basin (IRBMDMPR):

5.3.1 Ongoing flood control projects in Bangsamoro

BDA has a challenging plan, of which total cost is more than PHP 11.4 billion, to implement several flood control projects/programs starting from 2014. Most of them are national projects by DPWH, of which prefeasibility and/or feasibility studies were conducted as high-impact projects in the MRBIMDMP study except for the Baloi Plains Flood Control Projects, as shown in Table 5.9. The others are small shore protection, flood control and drainage projects to be implemented by DPWH-

ARMM of which project costs are PHP 5 to 10 million. These national projects are supposed to be implemented through DPWH Regional Office XII.

According to DPWH Central Office, the Baloi project is now being subject to Detail Engineering Design (DED), and DED will start very soon for the other major projects in the Mindanao River Basin (Selection of consultants for DED is ongoing). According to an official of DPWH, the major national projects are supposed to be funded by national funds, but there is still a room for ODA as the total necessary budget as much as PHP 11.4 billion has not be secured yet. In case of ODA, however, the project implementation will be considerably delayed.

Table 5.9 Major Flood Control Projects for BDP Phase 1

No.	River (Province)	Project	Project component	Cost (PHP 10^6)
1	Rio Grande de Mindanao and Tamontaka River (Maguindanao/Cotabato City)	Rio Grande de Mindanao and Tamontaka Flood Control System	- Dredging with land reclamation/spoilbanking: 2,227,000 m^3 for Rio Grande de Mindanao - Repair and construction of Rio Grande de Mindanao, Tamontaka Protective Pocket Dike	5,186
2	Buluan River (Maguindanao)	Buluan River Flood Control System	Clearing of water hyacinth and river improvement works	1,288
3	Pulangi River (Maguindanao)	Pulangi River Flood Control System	Repair of Tunggol Bridge, construction of cut-off channel, paralleldikes, Tunggol Bridge extension, repair of other bridges	673
4	Ambal-Symuay River (Maguindanao)	Ambal-Symuay River Flood Control System	River improvement works(Widening of cut-off channel, construction of a multi-purpose structure and 6 km left dike)	1,634
5	Ala River (Maguindana)	Ala River Flood Control System	Delineation of Ala River following its original course (construction of 3 km dike and evacuation centers)	743
6	Agus River (Lanao del Sur)	Balo-i Plains Flood Control Project	Construction of 14.3 km dike, bank protection works, and dredging, etc.	1,900
			Total	11,424

Source: DPWH.

Although pre-feasibility and/or feasibility studies were conducted for these projects, the studies remained at a primitive level by international standards in terms of following:

1) The pre-feasibility and feasibility studies are based on topographic information of coarse resolution.
2) Hydrological and hydraulic analysis models were not validated with actual observation data.
3) The basin-wide point of view including the effects of marsh areas and sediment supply from the upstream was lacking.
4) The contents of the projects were considerably modified but have yet to be reviewed.

Therefore, they still remain pre-matured, and need to be reviewed. It is strongly recommended that the long-term and overall projects be reviewed with a basin-wide point of view.

5.3.2 Flood forecasting and warning system by PAGASA

The PAGASA is the duly mandated agency to operate 98% of all hydro-meteorological observation networks in the Country. It issues all official forecasts, warnings, advisories, outlooks, and press releases on severe weather and extreme events such as tropical cyclones, floods, droughts/dry spell, and El Niño/La Niña. Currently PAGASA is operating flood forecasting and warning system in five river basins out of the 18 major river basins in the Philippines, and has an intention to expand the system over the remaining 13 major river basins including the Mindanao River Basin.

In MRBIMDMP, a pre-feasibility study on the development of early warning and flood forecasting project, which is to be undertaken by PAGASA, was conducted. The study proposed a flood forecasting and warning system consisting of three zones, namely (1) Data Collection Zone, (2) Command Zone, and (3) Warning Recipient Zone (Table 5.10). The project is planned to be implemented in two phases, taking into account constraints of finance and capacity of operators. In the first phase data collection and warning dissemination will be made manually through SMS (Short

Message System) by cellular phone, and full automation by introducing telemeter system and warning dissemination through Internet will be in the second phase. The total cost was estimated at about PHP 2.0 million.

On the other hand the Project Nationwide Operational Assessment of Hazards (NOAH) has commenced in 2012 under the DOST-ASTY's initiative, and telemetry system based on SMS is being constructed in the Mindanao River Basin, too, as described in the following section. Coordination or integration with the Project-NOAH will be a challenge for the realization of the flood forecasting and warning system for the Mindanao River Basin to avoid duplication of investment.

Table 5.10 Proposed Flood Forecasting and Warning System

Component	Contents
Data Collection Zone	A total of 13 stations are proposed in the Mindanao River Basin. Rainfall heights are measured and transmitted manually during Phase I while they will be converted into telemetered stations in Phase II.
Command Zone	One command center is proposed at CDRRMC Cotabato City, and four sub-command centers are proposed at PDRRMCs of Maguindanao, Sultan Kudarat, South Cotabato and Cotabato Provinces. The command center will receive the rainfall data that are stored in the database of the flood simulation model. During high rainfall event, visualization module of the simulation model will be activated to forecast the probable areas to be flooded based on the rainfall data. If there are places found to be flooded, a warning bulletin will be sent to their respective sub- command centers. The sub-command centers then will transmit the text message to probable affected warning recipient zones.
Warning Recipient Zone.	As warning recipients, 17 municipalities in Maguindanao, 12 municipalities in North Cotabato, 1 city in South Cotabato, and 5 municipalities in Sultan Kudarat are proposed.

Source: MRBIMDMP.

5.3.3 Project NOAH

The NOAH or the Project NOAH, launched in July 2012, is meant to be a responsive disaster management program that makes use of advanced scientific research and cutting edge technology to reduce risks in highly vulnerable communities. This project has been executed by DOST with the participation of a variety of related governmental and non-governmental organizations and donors including PAGASA, DOST, PHIVOLCS, University of the Philippines (UP), DILG, MMDA, DENR, DPWH, NDRRMC-OCD, Smart Communications, Inc., SUN Cellular, Google Crisis Response, Petron, www.lifesomundane.net, Rotary Club of Pinamalayan Central, World Bank, USAID, and GiZ.

The Project NOAH envisions a disaster-free Philippines where communities are empowered through open access to accurate, reliable and timely hazard and risk information, and has following missions:

1) To develop high-resolution hazard maps for various type of natural hazards using frontier science and cutting-edge technology;
2) To undertake investigations in meteorological and geological hazards to improve the country's capability to prevent and mitigate the potentially disastrous impacts of natural hazards;
3) To systematically simulate, validate, and improve geohazard maps;
4) To integrate and assist other agencies in identifying meteorological and geological hazards with the ultimate objective of promoting safety in communities affected by natural hazards; and
5) To collaborate with similar institutions or organizations, both national and international, in furtherance of the above purposes.

The Project NOAH has nine components, and the progress of each of the components related to BCT is summarized as shown in Table 5.11.

One of the potentially most important benefits of the Project NOAH is mapping of high resolution that is based on the LiDAR survey data with 50cm horizontal and 20cm vertical resolution for more important areas as well as the IFSAR survey data by NAMRIA with 5m horizontal and 1m vertical resolution. These detailed maps may be useful for investigation of evacuation routes and places and land use planning that are difficult with the existing MGB susceptibility maps that are based on 1/50,000 NAMRIA maps. On the other hand the NOAH maps have a weak point, too. They are not subject to

validation with observed data during past disasters such as flood marks and landslide areas. Therefore, they still might include a certain error in terms of accuracy, and should be improved and updated at every disaster event through validation with observed information.

The next challenges might be maintenance of the equipment and systems, and dissemination of the project products to local governments and communities. Especially the maintenance problem needs urgent attention. One third of the devices installed in ARMM in 2014 were already out of order. According to Dr. Alfredo Mahar A. Lagmay, the director of the project, the NOAH systems have been developed by university researchers, and since these researchers are not able to be engaged in the maintenance work, the developed equipment and systems should be taken over to an agency such as PAGASA. However, it has not been decided yet.

Another problem is the dissemination of the project products. If they are not practically used by the local governments and communities, the technically advanced project might fail finally. The Project should be integrated in the DRRM activities of the local governments and communities.

Table 5.11 Progress of NOAH Project for BCT as of February 2015

No.	Component	Present Status	Remarks
1	Distribution of hydro-meteorological devices: installation of automated rain gauges and water level monitoring station	45 devices (automated rainfall gauges, weather censors, water level censors, etc.) were installed in 2014, However, 14 of the 45 devices are inactive already. Observed data by the devices can be monitored on the web-site. DOST-ARMM has requested another 76 devices for 2015.	Short message services (SMS) is used for data transmission
2	Disaster risk exposure assessment for mitigation–Light detection and ranging (DREAM-LiDAR) project: Generation of accurate flood inundation and hazard maps;	Light detection and ranging (LiDAR) survey of some 700 km^2 and bathymetry survey for some 50 km stretch of the most downstream area of Mindanao River Basin were conducted. Flood inundation and hazard maps are being prepared for Mindanao River Basin	These hazard maps by this component are being developed by applying numerical models to accurate interferometric synthetic aperture radar (IFSAR) survey data by NAMRIA in addition to LiDAR and bathymetry survey data and are different from flood, and landslide susceptibility maps by MGB that were based on topographical analyses of 1/50,000 and filed investigation.
3	Enhancing geohazard mapping through LIDAR: Identification of landslide-prone areas	Maps of landslide areas can be accessed on NOAH website.	Analysis was based on NAMRIA's IFSAR survey results These maps by NOAH Project and landslide susceptibility maps by MGB are being separately prepared.
4	Coastal Hazards and Storm Surge Assessment and Mitigation (CHASSAM): Establishment of wave surge, wave refraction, and coastal circulation models	Modelling of storm surge were finished. Currently under validation	Analysis was based on NAMRIA's IFSAR survey results
5	Flood information network (FloodNET) Project: Formulation of flood early warning systems	Forecasted rainfall can be accessed on the NOAH website. Flood forecasting models for main rivers have been established, but have not been in use for operation yet due to insufficient computer capacity.	
6	Local development of Doppler radar systems (LaDDeRS): Development of local capacity to design, fabricate, and operate sub-systems of Doppler radars;	Rainfall of Tampakan Doppler Radar that covers the mainland of BCT can be seen on NOAH website. This information is used for weather and rain forecasting.	
7	Landslide Sensors Development Project: Development of early monitoring and warning system for landslides	BTC is out of target areas; no censor has been installed in BCT.	
8	Hazards information media: Strategic communication intervention and disaster management using WebGIS	Weather hazard information can be accessed on NOAH website.	
9	Weather information integration for system enhancement (WISE): Enhancement of national weather predicting capabilities by using high-performance computing (HPC) and smart analytics,	Weather prediction can be accessed on NOAH website.	

Sources: DOST-ARMM, PAGASA, and UP.

5.3.4 Mindanao River Basin Integrated Management and Development Master Plan

The Mindanao River Basin (MRB) is the second largest river basin in the Philippines with the catchment area of 21,503 km^2 which pours to the Illana Bay through Central and Southern Mindanao (Figure 5.13). Major rivers within the basin include the Ala River traversing the Ala Valley in the South, the Pulangi River with headwater from Bukidnon, the Ambal-Simuay River System originating from Lanao del Sur, and the Mindanao River and the Tamontaka River in the lowest part of the river basin. There are three huge marshes (Ligawasan, Ebpanan, and Libungan) in the central and lower parts of the basin, which act as natural storages to attenuate large flows including several lakes. Before entering Cotabato City, the Mindanao River bifurcates into the Rio Grande de Mindanao and the Tamontaka River. The river basin expands over two Provinces of Maguindanao and Lanao del Sur of ARMM, a province of Bukidnon of Region X, a province of Davao del Norte of Region XI, and three provinces of Sultan Kudarat, Cotabato and South Cotabato, and Cotabato City of Region XII.

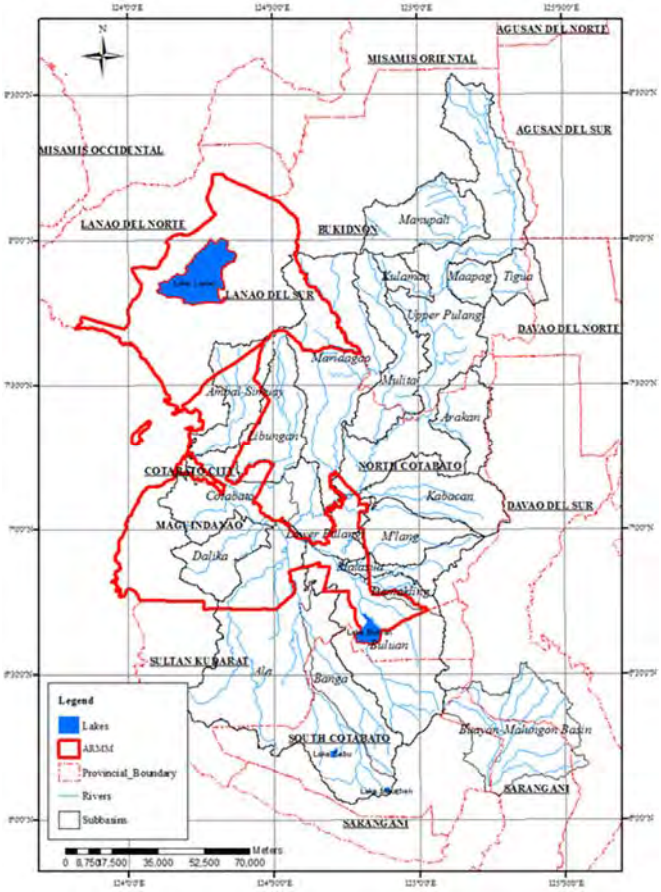


Figure 5.13 Mindanao River Basin

The Mindanao River Basin Integrated Management and Development Project Master Plan (MRBIMDMP) was prepared by a local consultant firm, Woodfields Consultants, Inc. in 2012. The plan aimed to determine the specific causes of the physical deterioration, and to formulate a master plan that would provide the blue print for a balanced development approach for the basin area through sound water resources development and management practices, although contents of the project components were considerably modified from the original ones in MRBIMDMP.

As part of the outputs of the master plan study, a variety of flood control and DRRM projects/programs were proposed as shown in Table 5.12. They cover non-structural measures as well as structural ones. As mentioned in the previous section, the first seven projects in the table have already entered into their preparation process, although the contents of the project components were considerably modified.

In addition, long-term, overall flood control projects were also proposed for the Rio Grande de Mindanao and the Ala, Pulangi River systems. However, neither pre-feasibility study nor feasibility have been conducted yet. Only conceptual illustrations are presented.

Table 5.12 MRBIMDMP Development Matrix for Flood and Disaster Risk Management

Development Vision	A Mindanao River Basin that is a sustainable area of peace and development where all stakeholders, striving as active collaborators and competent stewards of the Almighty Creator, adhere to the judicious use of its natural resources to enjoy nondiscriminatory socio-economic growth, human development and ecological balance that is inclusive for all and without aggression to anyone or anything.
Development Goal	Ensure a focused, comprehensive and integrated development and management of the Mindanao River Basin that would prevent, mitigate and protect its stakeholders from any calamities and disaster risks, and facilitate the attainment of sustainable development.
Development Issues & Challenges	Increasing occurrence and worsening effects of floods, and risks from other natural hazards.

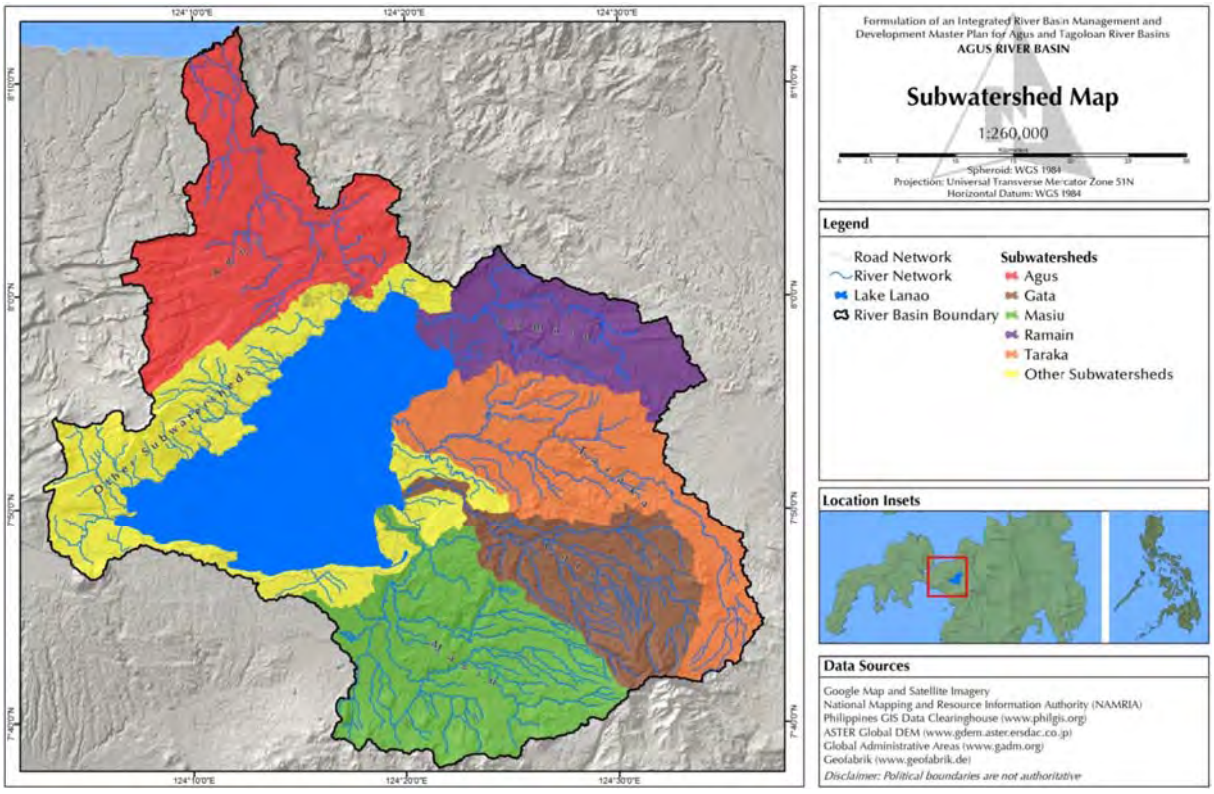
Goals	Objectives	Strategies	Program/Project/Activity	Status (as of Feb. 2015)
Strengthened flood and other disaster risk management through increased cooperation and partnership with local government units and other stakeholders towards building safe and resilient communities.	To develop, implement and maintain a flood control management system in active collaboration with concerned national and local stakeholders	Adoption of an integrated flood management approach	Integrated Flood Control, River Bank Protection and Rehabilitation of Ambal-Simuay River System	FS completed. DED to start soon
			Siltation Control and Management for Rio Grande de Mindanao River System	FS completed. DED to start soon
			Siltation Control and Management for Ala River System	FS completed. DED to start soon
			Siltation Control and Management for Buayan-Malungon River System*	FS completed. DED to start soon
			Integrated Flood Control, River Bank Protection and Rehabilitation of Rio Grande de Mindanao System	Pre-FS completed. DED to start soon
			Integrated Flood Control, River Bank Protection and Rehabilitation of Ala River System	Pre-FS completed. DED to start soon
			Integrated Flood Control, River Bank Protection and Rehabilitation of Pulangi System	Pre-FS completed. DED to start soon
			Integrated Flood Control, River Bank Protection and Rehabilitation of Buayan-Malungon River System*	Pre-FS completed.
			Early Warning and Flood Forecasting System for the MRB and BMRB*	Pre-FS completed.
			Dendro-Thermal Power	Pre-FS completed.
			Implementation of thematic development plans and projects for watershed management, wetland management, water resource management & development, human development and creation of the MRBA*	
			Establishment of a technical coordinating sub-unit within the proposed MRB-DRRM Technical Committee focusing on Integrated Flood Management.	
		Basin-wide risk assessment and monitoring	Establishment of a basin-wide multi-hazard early warning and forecasting system	
			Establishment of a basin-wide knowledge management center on disaster risk management	
		Strengthen disaster preparedness	Establishment of an MRBA*-DRRM Technical Committee	
			Acquire necessary equipment and facilities on rescue/response to support LGUs in managing disaster emergency situations	
			Design and conduct series of training-workshops on preparedness and contingency planning	
			Preparation and implementation of a basin-wide community-oriented	
			IEC campaign on climate change and disaster risk reduction	
		Capacity development for the LGUs and other basin stakeholders	Creation/organization of instructors and trainers on disaster risk assessment (hazard characterization, frequency analysis, consequence analysis, risk estimation, risk evaluation and GIS) to support/augment local initiatives	
			Creation of a pool of experts from the academe/industry for scientific research on hazards and risks that will provide specialized advice to LGUs and other basin stakeholders	

		Mainstream DRRM and CCA in all development policies, programs and plans of sub-national government agencies, LGUs and other basin stakeholders	Preparation and implementation of an MRB disaster risk management comprehensive resource development plan	
			Monitoring and evaluation system on DRRM and CCA mainstreaming efficacy by the MRBA	

*Buayan-Malungon River Basin (BMRB): Allied river basin of the Mindanao River Bain (MRB); located in Regions XI and XII.

5.3.5 Integrated River Basin Management and Development Master Plan for Lanao (Agus) River Basin

The Lanao (Agus) River Basin is one of the 18 major river basins in the Philippines. The total catchment area is 1,987 km^2 consisting of five major sub-basins namely, Agus, Gata, Masiu, Ramain, and Taraka (Figure 5.14). All the major sub-basins except for the Agus River supply water to the Lake Lanao. The Agus River serves as the drainage of the Lake Lanao, and is famous for a cascade hydropower generation system where water from the Lake Lanao is regulated and released to the Agus River through the Agus I Regulation dam in Marawi City. 89% of the Ranao (Agus) River Basin catchment area is under the administrative jurisdiction of Lanao del Sur Province of ARMM, while 11% is part of Lanao del Norte of Region 10.



Source: IRBMPRRB.

Figure 5.14 Lanao (Agus) River Basin

The Integrated River Basin Management and Development Master Plan for Lanao (Agus) River Basin was completed by the College of Forestry and Natural Resources of the University of the Philippines Los Banos in January 2015. The master plan study aimed to formulate an Integrated River Basin Management and Development Master Plan for the Lanao (Agus) River Basin, which addresses concerns on 1) Water Resources Management, 2) Watershed Management, 3) Flood Control/Mitigation and Disaster Risk Reduction Management and Hazard Management, 4) River and River Delta

Management, 5) Coastal and Fresh Water Resources Management, 6) Biodiversity Conservation, 7) Climate Change Adaptation and Mitigation, 8) Mineral Resources Management, 9) Sustainable Management through Community Participation, 10) Economic Development, and 12) Institutional Linkages and Organizational Structure for River Basin Management.

According to the Flood and Landslide Susceptibility Map by MGB (Figure 5.3), flood prone areas cover about 10% of the total catchment area. The Ramain and Taraka sub-basins and the other sub-basins surrounding the Lake Lanao are more susceptible to flooding. The Gata sub-basin is the most susceptible to landslide.

With a development objective to establish a flood-free Lanao (Agus) River Basin, several structural and non-structural flood control, disaster risk reduction and management, and climate change adaptation projects/programs were proposed as shown in Table 5.13. It is deemed that these projects/programs were elaborated mainly through various stakeholders during a series of consultations and meetings, but engineering study was hardly conducted to form the projects/programs. Thus, the proposed projects/programs should be regarded as conceptual ones.

Table 5.13 Proposed Projects for Disaster Risk Reduction and Climate Change Adaptation Program

Programs/Projects	Location	Implementing Agency	Total Estimated Cost (PHP 10^6)	Expected Source of Fund
Installation, Operation and Maintenance of Weather Monitoring Stations	Marawi city, Iligan City	RBCO, DOST, DENR	35	ODA, GOP
Establishment of early flood warning system	IliganC ity, Ramain, Taraka, Gata and Malaig	RBCO, DOST, DENR	25	GOP, ODA
Construction, operation and maintenance of smart flood control structure	Iligan City, Ramain, Taraka, Gata and Malaig	DPWH	300	GOP, ODA, PPP
River Channelization	Ramain, Taraka, Gata and Malaig	DPWH	150	GOP, ODA, PPP
Development of high resolution flood model and flood Hazard Maps of Lanao River Basin	Lanao River Basin	DREAM, DENR	10	ODA, DOST, DENR
Capacity Development of LGUs on DRR and CCA	39 cities and municipalities inside the Lanao River Basin	LGUs, DILG, CCC, DENR, DA, DOH, DOST, DPWH, DOE	642	Grant, Loan, Presidential Support Fund (PSF)
Rapid Visual Vulnerability Assessment of Structures	Iligan City, Marawi City	DOST, DPWH	15	GOP, ODA
Seismic Hazard and Risk Mitigation Planning	Iligan City, Ramain, Taraka, Gata and Malaig	DOST, DPWH	20	GOP, ODA
		Total	1,197	

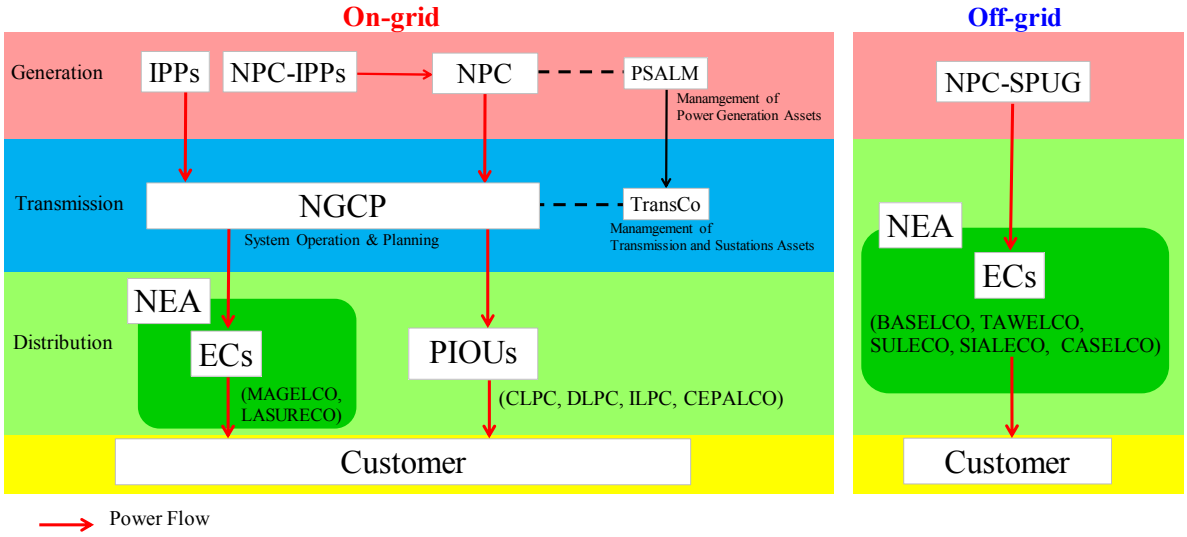
CHAPTER 6 EXISTING CONDITIONS AND DEVELOPMENT ISSUES OF POWER SECTOR IN BANGSAMORO

6.1 Existing Situations of Mindanao Power Sector

6.1.1 Structure of power sector

As of January 2015, the power sector in the Philippines is divided into power generation, power transmission, and power distribution business fields respectively, where the national and private power operators are coexisting as power suppliers playing interrelated roles. The conceptual diagram of the power business structure is shown in Figure 6.1. In the Mindanao Island, the contracts of electricity transactions between generation companies and distribution companies or customers are based mainly on a bilateral basis. Electricity transactions in the Luzon and Visayas regions are conducted through the wholesale power trading market with the exception of a bilateral contract.

In the Mindanao Island, the Interim Mindanao Electric Market (IMEM), which is a mandatory program for all generation capacities, customers with embedded generation, and distribution utilities, was officially launched in September 2013. However, it is requiring further improvement in terms of system design, contract rules, etc. and the Department of Energy (DOE) is presently making its effort to address those issues in order to allow it to properly function. In the future, the IMEM is to be transitioned to the wholesale power trading market similar to the one in Luzon and Visayas.



Source: Power Industry in Overseas Countries (JEPIC), MEP 2014-2030 (DOE).

Figure 6.1 Concept of Power Business Structure in Mindanao

6.1.2 Power sector institutions and organizations

(1) Electric Power Industry Restructuring Act

In 2001, the Electric Power Industry Restructuring Act (EPIRA) was enacted in the power sector of the Philippines and its restructuring process is still ongoing. The purposes of the EPIRA are to 1) sell NPC assets, 1) introduce market mechanism by establishing wholesale power market, and 3) introduce competition in the sales of electricity by liberalizing the power retail market.

(2) Power sector organizations

DOE

The Department of Energy is the central governmental administrative authority that plays a role of

formulating basic policies and energy program related to the development and utilization of energy resources.

NPC

The National Power Corporation (NPC), established in 1936, used to own the majority of power plants and transmission lines and be the principal power provider in the Philippines. After independent power producers (IPPs) were approved to enter the power market in 1993, the financial status of NPC was seriously aggravated because power purchase from IPPs at a high rate, responsibility for fuel supply, and exchange rate risk were a burden on NPC. Furthermore, a drop of peso caused by the Asian Currency Crisis confounded its management condition and the financial deficit of the government, consequently, was viewed with suspicion.

In response to this situation, the Philippine Government enacted the EPIRA to restructure the power sector. Since the EPIRA enforcement, the assets owned by NPC have been sold and privatized in order. As of January 2015, the power supply by power plants, namely, Power Barge (PB) 104 and Agus-Pulangi Complex, operated by NPC accounts for 41% (828 MW) of the total power output 1,794 MW generated by all power plants connected to the Mindanao grid. According to *24th Electric Power Industry Reform Act Implementation Status Report*, a periodical issued by ERC, the ownership of the Agus-Pulangi Hydropower Complex will be subject to consultation with the Congress, and whether or not the water tapped from Lanao Lake should be attributed to the Bangsamoro autonomous equity or the Philippine Government will be discussed.

NPC-SPUG

The National Power Corporation-Small Power Utility Group (NPC-SPUG) is an organization established inside NPC; the unit has a responsibility for supplying the power for Islands such as Basilan, Sulu, and Tawi-Tawi, and missionary areas (remote areas) without connection to the grid. NPC-SPUG is in charge of maintaining and operating small-scale generators and planning the power development plan in the missionary areas. The power generated by NPC-SPUG is supplied for distribution utilities such as electric cooperatives.

PSALM

The Power Sector Assets and Liabilities (PSALM) was established based on the EPIRA to proceed with the sale of available assets owned by NPC for the repayment of a debt of NPC. Two power plants in Mindanao, namely, PB104 and Agus-Pulangi hydro Complex, are owned by PSALM.

TransCo

The National Transmission Corporation (TransCo) was originally the transmission department in the NPC. Based on the EPIRA enforcement, it was spun off from NPC and established as TransCo, which owns the assets of the transmission facilities ever owned by NPC. TransCo has a responsibility for managing and supervising the transmission business operated by NGCP.

NGCP

The National Grid Corporation of the Philippines (NGCP) is a private company that maintains, operates, plans, and constructs 138kV and 69kV power transmission network in the Philippines. NGCP took over the system operation business of TransCo that spun off from the transmission department of NPC through bidding. As dispatching control centers in Mindanao, Mindanao Regional Control Center (MRCC) is conducting power demand and supply operation and five Area Control Centers (ACCs) are conducting system operation allocated to each ACC in Mindanao. Also, Back-up function of MRCC is installed in the Iligan ACC.

NEA

The National Electrification Administration (NEA) is not only to manage and supervise electric cooperatives in the Philippines but also to provide them with financial support for regional electrification. NEA sets the goal of achieving the electrification of all regions by the end of 2020.

ECs

Electric cooperatives (ECs) are non-profit public organizations to distribute power. In Mindanao, 33 ECs exist including neighboring islands. The franchise of ECs in Mindanao is shown in Figure 6.2. Also, the list of ECs whose franchise could be included in Bangsamoro is shown in Table 6.1.

ECs provide the power for their customers through their owned distribution network and maintain, plan and construct the distribution lines including 69kV sub-transmission lines. In the first quarter of 2014, the performance assessment targeting for ECs was conducted by NEA and all the ECs were classified into *Green*, *Yellow (b-1)*, *Yellow (b-2)* and *Red* in terms of its operation and financial status.

Most of ECs in ARMM are categorized into the group Red, which indicates that performance improvement is strongly required. Especially, Mindanao Electric Cooperative (MAGELCO) was evaluated as the worst rate (the 11th of the 11 ECs included in the group Red). With regard to other ECs in ARMM, Lanao Del Sur Electric Cooperative (LASURECO) was 10th, Sulu Electric Cooperative (SULECO) was 9th, Basilan Electric Cooperative (BASELCO) was 8th, Tawi-Tawi Electric Cooperative (TAWELCO) was 7th in the group Red. The assessment report shows that most of ECs in ARMM are facing the severe condition from an operational and financial point of view.

Table 6.1 List of Potential Franchise Areas of ECs in Bangsamoro

No.	Region	Name of ECs
Mindanao Island		
1	ARMM	Mindanao Electric Cooperative (MAGELCO)
2		Lanao Del Sur Electric Cooperative (LASURECO)
Neighboring Islands		
3	ARMM	Basilan Electric Cooperative (BASELCO)
4		Sulu Electric Cooperative (SULECO)
5		Siai Electric Cooperative (SIASELCO)
6		Tawi-Tawi Electric Cooperative (TAWELCO)
7		Cagayan De Sulu Electric Cooperative (CASELCO)

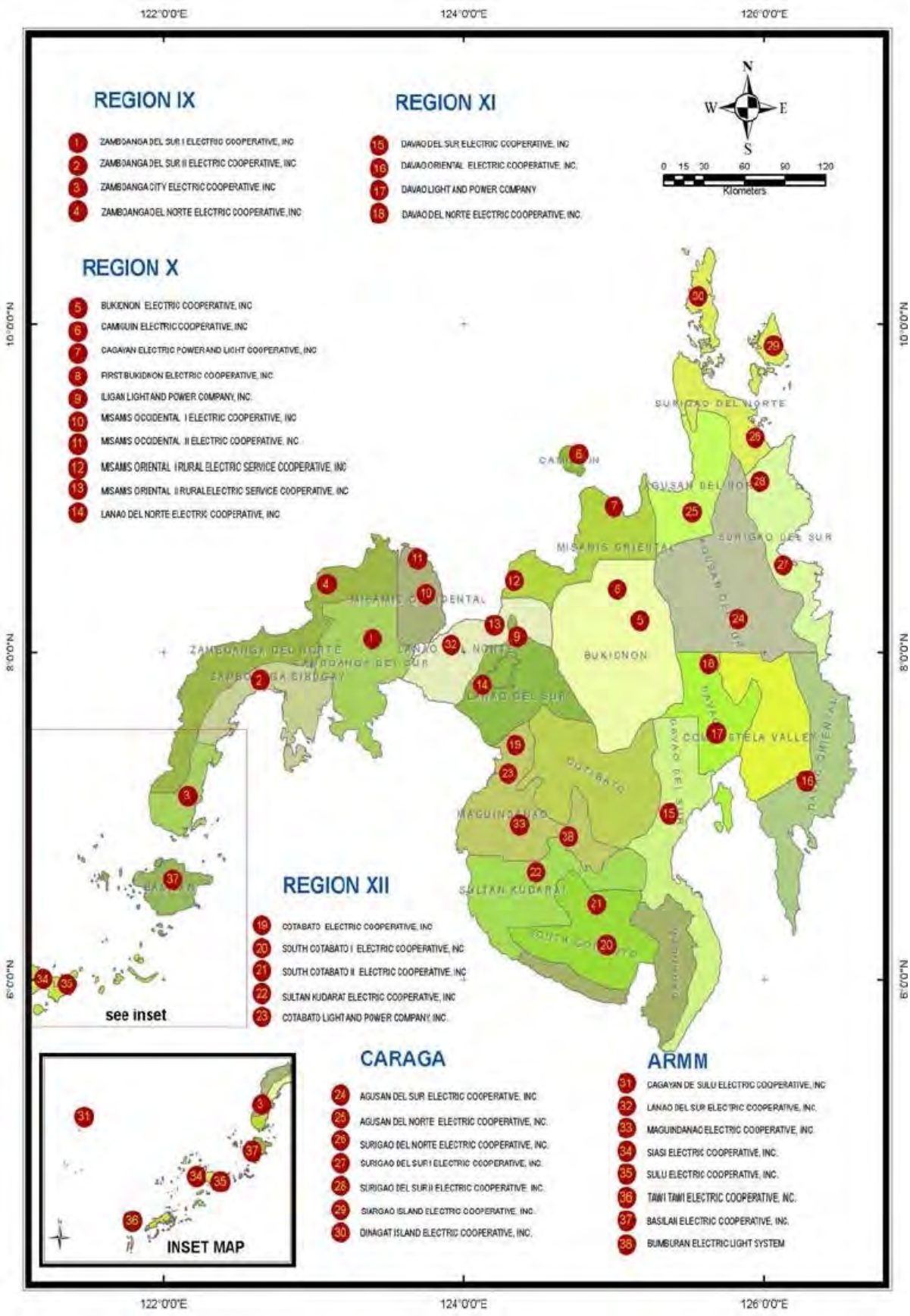
Source: JICA Study Team.

PIOUs

Aside from ECs, there are private investor-owned utilities (PIOUs) and local government unit-owned utilities (LGUOUs) operated by local governments in the Philippines. In Mindanao, two major private distribution utilities (DUs), Davao Light and Power Company (DLPC) and Cotabato Light and Power Company (CLPC), both owned by one of major holding company representing the Philippines, Avoitiz group, and Iligan Light and Power Company (ILPC), and Cagayan Electric Power and Light Company (CEPALCO) are doing their business as PIOUs. Of those DUs, CLPC is supplying the power for Cotabato City in ARMM.

ERC

The Energy Regulatory Commission (ERC) was established on the basis of the EPIRA. It is authorized to regulate and supervise generation, transmission, and distribution business fields. Also, ERC has a role for streamlining regulatory rules of the power supply and acceleration of competition in the power market.



Source: DOE, DDP 2010–2019.

Figure 6.2 Franchise Areas of ECs in Mindanao

6.1.3 Power generation, transmission and distribution

(1) Power generation

As of March 2014, the total rated power output of all generation facilities in Mindanao is 2,087.2 MW and the total dependable power output is 1,794.4 MW. Generation capacity consists of diesel with a 31.8% share, hydro 50.2%, coal 11.1%, geothermal 5.2%, and biomass 1.7%. New IPPs using coal are planned to be constructed in the near future, and the dependence on the hydro power generation is projected to decrease. NPC accounts for 50% of the generation capacity, and PSALM shares 25%. The Agus-Pulangi hydro complex with combined generating capacity of 727 MW is the largest power source, and the ownership of the generating plants and energy sources of Lake Lanao have been discussed at the Congress.

Generators connected to the off-grid exist in the islands of ARMM, and they are operated by NPC-SPUG. All of them are diesel generators, and the one in Basilan is the largest unit with a capacity of approximately 20 MW, followed by the unit in Sulu with15 MW. In Tawi-Tawi, a generator with a capacity of approximately 6 MW is installed as well as smaller-scale units dispersed throughout the island. As these generators are run by diesel fuel oil, environmental impact is large, and they can be operated only for six to eight hours a day due to mechanical limitations.

Table 6.2 shows the list of generators connected to the off-grid in ARMM (Islands). As seen from the table, the dependable capacity of all the generators in the islands is smaller than the installed capacity. This is because the actual output is set to be 80% of the installed capacity. However, due to the shortages of spare parts and aging of facilities and equipment, some units can produce power only at 60% to 70% of the installed capacity.

Table 6.2 List of Generators Connected to Off-grid in ARMM

NPC-SPUG Power Plants	ECs	Existing Capacity		Operating hours	Location
		Installed (MW)	Dependable (MW)		
Sulu	SULECO	15.54	10.40	24	Sulu
Luuk	SULECO	0.33	0.29	8	Sulu
Siasi	SIASELCO	2.08	1.65	20	Sulu
Tawi-Tawi	TAWELCO	6.49	4.16	24	Tawi-Tawi
Cagayan de Tawi-Tawi	CASELCO	1.02	0.80	8	Tawi-Tawi
Balimbing	TAWELCO	0.73	0.65	8	Tawi-Tawi
Manuk-Mangkaw	TAWELCO	0.16	0.15	6	Tawi-Tawi
Sibutu	TAWELCO	0.33	0.28	6	Tawi-Tawi
Sitangkay	TAWELCO	1.16	0.99	6	Tawi-Tawi
Tandubanak	TAWELCO	0.44	0.38	6	Tawi-Tawi
Tandubas	TAWELCO	0.26	0.22	6	Tawi-Tawi
West Simunul	TAWELCO	0.73	0.63	6	Tawi-Tawi
Basilan	BASELCO	20.05	14.40	24	Basilan
Total		49.32	35		

Source: DOE, Mindanao Energy Plan 2014.

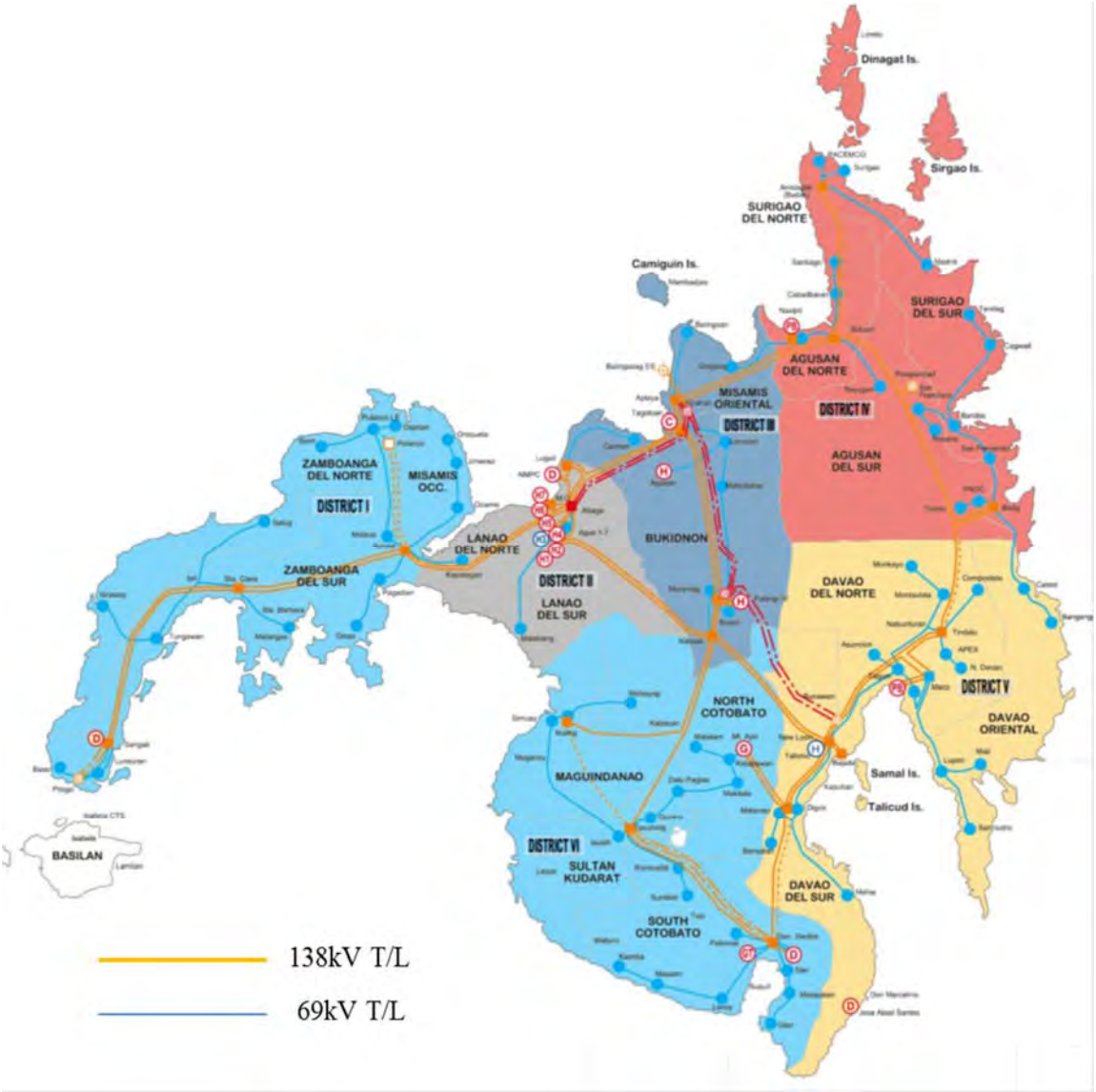
The ratio of IPPs in all the generation facilities in Mindanao remains to be small at approximately 25%. IPPs are classified into NPC/IPPs that sell the power to NPC based on a supply-demand contract with NPC and non-NPC/IPPs that supply the power to customers through the transmission network based on the bilateral contract.

The major conglomerate managing IPPs in Mindanao is Aboitiz group and approximate 19% of all the power plants in Mindanao are operated by subsidiary companies under the umbrella of Aboitiz group. Not only Therma Mobile Inc. and Therma Marine Inc. that have generators with a capacity of 100 MW respectively but also local distribution company, CLPC with diesel generators that supplies the power for Cotabato City and DLPC that supplies the power for Davao City are wholly owned subsidiary companies of Aboitiz group. As a second typical conglomerate, Alson Power group is well-known group operating several IPPs. The power plants owned by Alson group account for approximately

14% of all the power plants in Mindanao. Mapalad Power Corporation having generators with a capacity of 103 MW is also a subsidiary under Alson Power group.

(2) Power transmission

The transmission system in Mindanao, consisting mainly of "On-grid" and "Off-grid", is operated at the voltage class of 138kV and 69kV. The transmission system including substations is operated and maintained by the private company, NGCP, based on the grid-code under supervision of TransCo that manages the transmission and substation assets. The on-grid in Luzon and Visayas is mutually inter-connected through under marine cables, but the on-grid in Mindanao is not connected to the Luzon-Visayas power system. The system diagram in the Mindanao Island is shown in Figure 6.3.



Source: NGCP, Transmission Development Plan 2013.

Figure 6.3 Mindanao Power Supply System Diagram

Power flow in the Mindanao main grid reflect location of main power sources. That is, the power is transmitted largely from the north to the south, because many power plants with a large capacity such as the AGUS hydro power plant are situated in the northern part of Mindanao and the regions consuming much load such as Davao City are situated in the southern part of Mindanao. In the Bangsamoro region, the power flows for each transmission line from Kibawe to Sultan Kudarat with 32.2 MW and Tacurong with 66.6 MW located in the province of Maguindanao.

Table 6.3 shows the scales of transmission and substation facilities in the Mindanao main grid.

Table 6.3 Transmission and Substation Facilities in Mindanao Main Grid

Voltage class	Transmission lies (ckt-km)	Sub-transmission lines (ckt-km)	Substation capacity (MVA)
138 kV	3,268.09	33.84	3,240
69 kV ≥	4	1,839.71	77.5
Total	3,272.09	1,839.71	3,317.5

Source: NGCP, Transmission Development Plan 2013.

(3) Power distribution

Power distribution system in Mindanao is operated by ECs or PIOUs. Table 6.4 shows distribution voltage applied to the distribution network in Mindanao. The applied voltage and number of power lines are determined based on the conditions of power demand scale and power contract with customers. In ARMM, the jointly used poles shared by transmission lines and distribution lines are observed (Photo 6.1).

Table 6.4 Distribution Voltage Applied in Mindanao

Classification	Voltage	Type of neutral grounding point
High Voltage	13.2 kV (3-phase 3-line, 3 phase 3-line), 7.62 kV (1-phase)	Solidly grounded
Low Voltage	240V (1-phase 2-line), 3-phase 3-line	—

Source: NEA.

Photo 6.1 Shared Transmission and Distribution Lines in Cotabato City

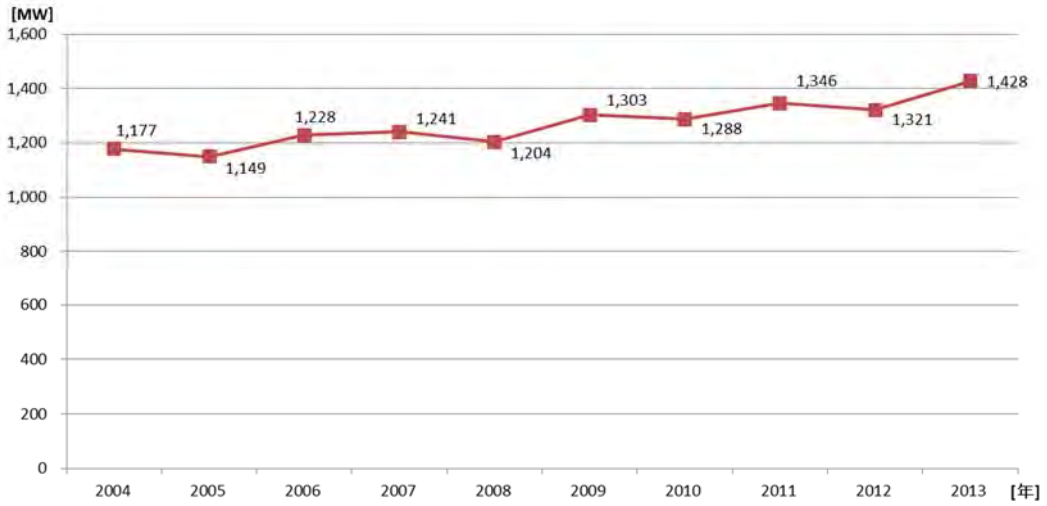
Both transmission lines and distribution lines are owned and maintained by CLPC that supplies the power for Cotabato City. According to CLPC, the upper transmission lines are power facilities that were constructed to link points receiving the power from NGCP to improve the reliability of power supply.

Under normal conditions, the power is supplied for Cotabato City by the distribution line of CLPC via the Sultan Kudarat substation managed by NGCP. If the power supply is interrupted due to the system fault occurred at the upper transmission system of NGCP, the power failure can be restored by supplying the power from the extra power source through the Tacurong substation. CLPC accomplished high

supply reliability by introducing this system configuration.

6.1.4 Power demand

The power demand in Mindanao is on a strong upward trend and the average growth rate of power demand is approximately 3.8% over the past decade. Figure 6.4 shows the actual demand in Mindanao from 2004 to 2013.



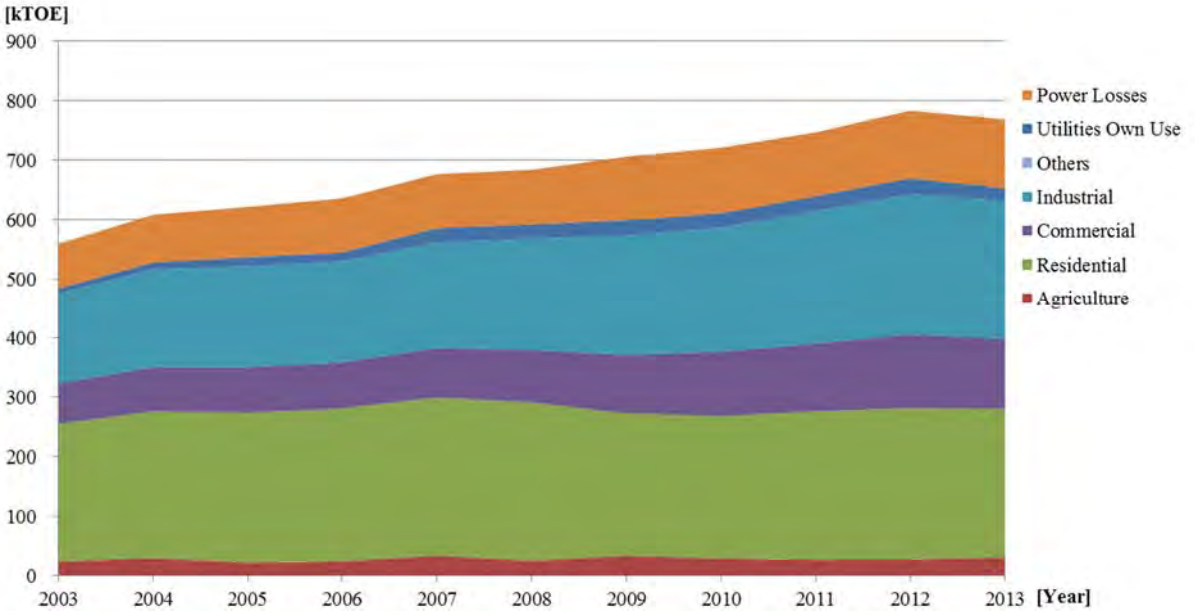
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Peak Demand [MW]	1,177	1,149	1,228	1,241	1,204	1,303	1,288	1,346	1,321	1,428
Growth Rate	4.07%	-2.38%	6.88%	1.06%	-2.98%	8.22%	-1.15%	4.50%	-1.86%	8.10%

Source: DOE, Philippine Power Statistics 2013 & Mindanao Energy Outlook 2014–2030.

Figure 6.4 Peak Power Demand in Mindanao

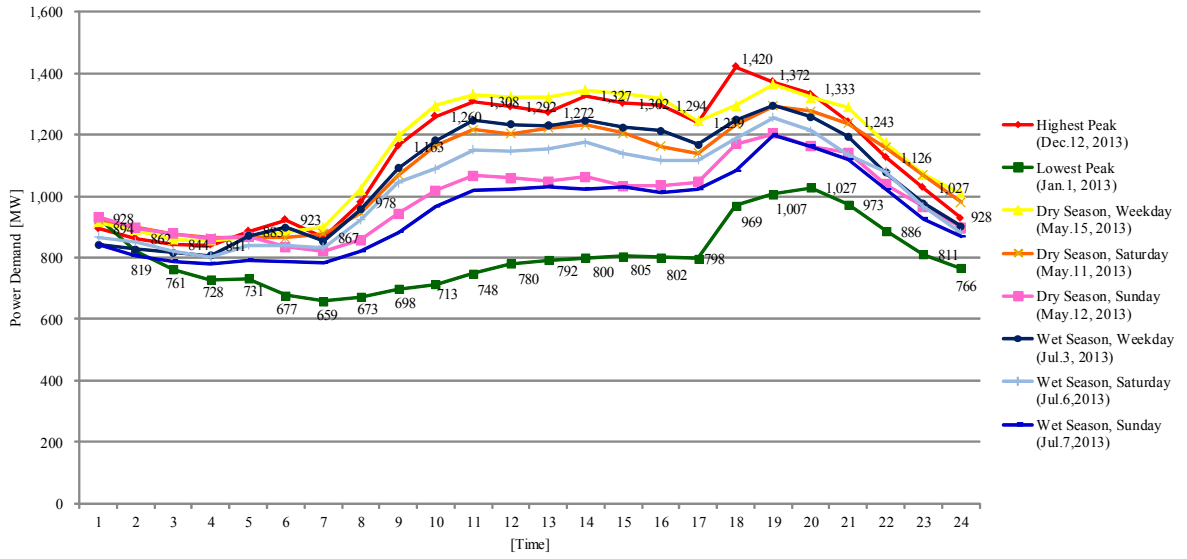
In a certain year, negative growth is observed but the peak demand is growing at the average rate of approximately 2.45%. In accordance with this growing trend of the peak demand, the energy consumption is also growing as shown in Figure 6.4. As of FY 2013, the energy consumption for residential use is the leading primary use representing 41.5% (249kTOE) of the total power consumption. The energy consumptions for industrial and commercial uses account for 38.9% (233 kTOE) and 19.7% (118 kTOE), respectively.

Figure 6.5 presents the daily load curve showing the power demand changing from hour to hour in the Mindanao main grid. The power load tends to reach the peak from 18:00 to 20:00 in the evening and the maximum power demand to be recorded till the end of 2013 is 1,420 MW recorded on December12, 2013. On the other hand, the minimum power demand is 1,027 MW recorded on January1, 2013. However, this load duration curve is superficial because this is formed including a result of load curtailment during the daytime caused by the shortage of power supply. It might become the different shape if this is formed without an effect of load curtailment. As a trend, the power consumption in the dry season is a bit larger than the one in the wet season.



Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Agriculture	23	29	21	24	34	25	33	28	26	27	31
Residential	231	246	252	257	265	266	239	239	250	254	249
Commercial	68	74	76	78	83	88	98	109	114	124	118
Industrial	153	166	172	171	180	189	203	210	224	238	233
Others	0	0	0	0	0	0	0	0	0	0	0
Electricity Sales	**452**	**487**	**500**	**506**	**528**	**543**	**540**	**558**	**588**	**616**	**600**
Utilities Own Use	9	12	15	15	24	24	25	24	25	26	21
Power Losses	75	80	85	91	91	92	107	110	107	114	116
Total	**536**	**579**	**600**	**612**	**643**	**659**	**672**	**692**	**720**	**756**	**737**

Source: DOE, Mindanao Energy Outlook 2014–2030.



Source: Provided by NGCP.

Figure 6.5 Daily Load Curves in Mindanao Main Grid

6.1.5 Conventional energy sources

The present JICA Study focusses on power supply policies for Bangsamoro instead of covering the broader energy sector as a whole. The Philippine Government promotes use of renewable energy for power supply in general. In Mindanao, a large coal-fired thermal plant will be commissioned in 2016,

followed by small hydropower plants to resolve power shortages by the main grid power supply. Also, Oil-fired thermal power and gas turbine plants make the unit cost of electricity higher than the existing hydropower derived electricity. In view also of adverse environmental effects, conventional power supply based of fossil fuel resources is not dealt with in the Study.

There exists natural gas potential in the Liguasan Marsh area of Maguindanao, which may deserve investigation. A pre-feasibility level study may be undertaken to examine this possibility for power supply.

6.1.6 Renewable energy

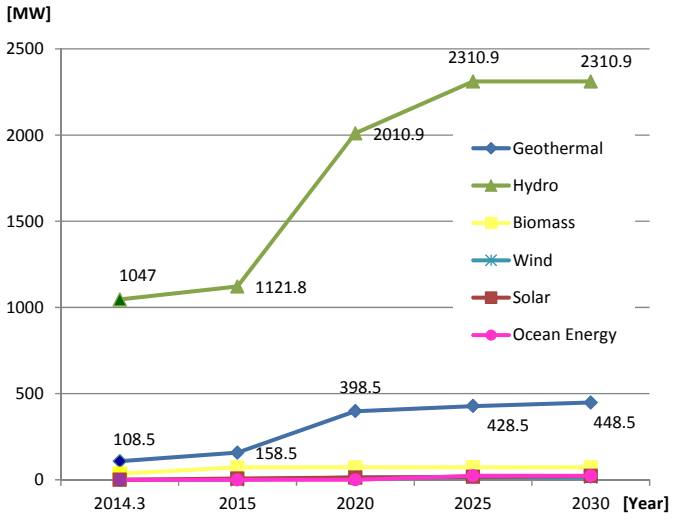
(1) National policy and targets

In the Philippines, renewable energy (RE) is being gradually introduced since the promulgation of Renewable Energy Laws enacted in 2008, which aims to protect the environment and ensure the national energy security. In the National Renewable Energy Program (NREP) DOE formulated as the development plan, the target for introducing of RE such as geothermal, hydro, biomass, wind, solar and ocean energy is set for the whole area of the Philippines and each region of Luzon, Visayas and Mindanao. Table 6.5 shows the targets allocated by accumulated annual goal set for each type of renewable energy on the capacity of existing units in Mindanao (Figure 6.6).

Table 6.5 Target Capacity Addition for Introducing Renewable Energy in Mindanao

Sector	Installed Capacity, (MW) as of 2010	Target Capacity Addition by				Total Capacity Addition (MW) 2011-2030	Total Installed Capacity by 2030
		2015	2020	2025	2030		
Geothermal	103.0	50.0	240.0	30.0	20.0	340.0	443.0
Hydro	1,040.0	74.8	889.1	300.0	0.0	1,263.9	2,303.9
Biomass	0.0	36.8	0.0	0.0	0.0	36.8	36.8
Wind	0.0	0.0	15.0	0.0	0.0	15.0	15.0
Solar	1.0	7.0	5.0	5.0	5.0	22.0	23.0
Ocean	0.0	0.0	0.0	24.0	0.0	24.0	24.0
TOTAL	1,144.0	168.6	1,149.1	359.0	25.0	1,701.7	2,845.7

Source: DOE, Renewable Energy Plans and Programs.



Source: DOE.

Figure 6.6 Targets for Renewable Energy Introduction to Mindanao

By the end of 2030, the hydropower capacity will be most developed as the largest target of 1,263.9 MW, followed by the development of geothermal with 340 MW. The development of biomass, wind, solar and ocean energy are relatively small. In order to achieve these goals, it is required that a comprehensive system is developed to cope with a gap impeding popularization of RE, and an action plan is formulated to promote the investment by the private sector. Also, proper setting of fee-in-tariff (FIT) is required to stimulate the spread of RE. Table 6.6 shows the FIT rate approved by ERC on July 2012.

Table 6.6 Free-in-Tariff (FIT) Electricity Rates Approved

Types of RE	PHP/kWh
Wind	8.53
Biomass	6.63
Solar	9.68
Hydropower (run-of-river)	5.90

Source: DOE, Mindanao Energy Plan 2014.

(2) Hydropower

According to MEP（Mindanao Energy Plan 2014–2030）created by DOE, it is estimated that the hydro resource potential is equivalent of 1,379.32 MW with 238 potential sites identified in Mindanao. Of the total potential resources, the hydropower potential with 17 identified sites which could provide a total aggregate capacity of 27.15 MW is estimated in ARMM. Hydropower potential resources in Mindanao are shown in Table 6.7.

Table 6.7 Hydropower Potential Resources in Mindanao, December 2013

Region	Location	No. of potential sites	Total estimated capacity (MW)
IX	Zamboanga Peninsula	28	80.06
X	Northern Mindanao	63	679.79
XI	Davao Region	41	151.58
XII	SOCCSKSARGEN	46	161.05
XIII	Caroga	43	279.69
ARMM	ARMM	17	27.15
Total		238	1,379.32

Source: DOE, Mindanao Energy Plan 2014.

A ratio of hydro potential resources in ARMM accounts only for 2% of the total potential capacity in the whole area of Mindanao and the number of hydro potential sites the least compared to other regions. Table 6.8 shows hydro potential resources by province in ARMM. No hydropower development project is planned in ARMM.

Table 6.8 Hydro Potential Resources by Province in ARMM

Province	No. of sites	Potential capacity (MW)	Pre-development investment requirement (PHP 10^6)
Maguindanao	8	5.23	562.23
Lanao Del Sur	7	11.29	1,213.68
Sulu	2	10.63	1,142.73
Total	17	27.15	2,918.64

Source: DOE, MEP 2014–2030.

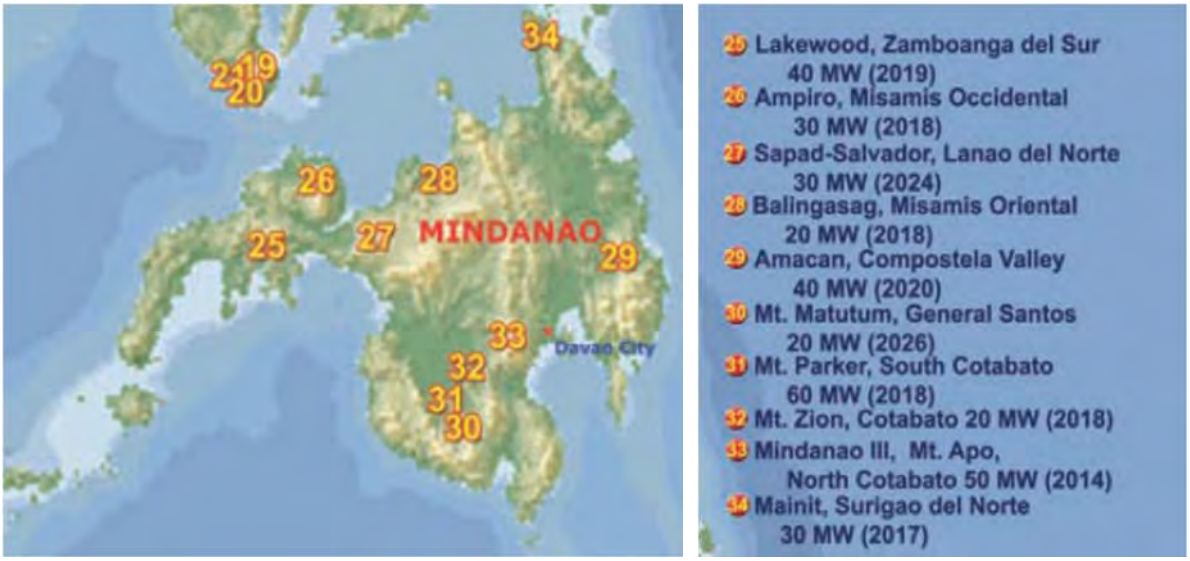
(3) Geothermal energy

The geothermal power potential resources estimated as of December 2013 are 290 MW in Mindanao. Table 6.9 shows the geothermal power potential resources in Mindanao (Figure 6.7). As of January 2015, no addition of geothermal power plants is planned in ARMM.

Table 6.9 Geothermal Power Potential Resources in Mindanao

Region	Location	No. of potential sites	Total estimated capacity(MW)
IX	Zamboanga Peninsula	1	40
X	Northern Mindanao	3	80
XI	Davao Region	1	40
XII	SOCCSKSARGEN	3	100
XIII	Caroga	1	30
Total		9	290

Source: DOE, Mindanao Energy Plan 2014.



Source: DOE, Renewable Energy Plans and Programs (2011–2030).

Figure 6.7 Map of Geothermal Potential Sites in Mindanao

(4) Biomass

Mindanao is endowed with rich biomass resources due to its inherent high land productivity. According to the biomass potential map issued by DOE, the bagasse potential resources are nil, while rice potential resources are estimated to be 4.47 MW and coconuts 84.87 MW. As of January 2015, two projects of biomass power plants in Maguindanao province are ongoing, scheduled for commissioning by the end of 2015. The output of each power plant is 1.6 MW and 10 MW respectively. Table 6.10 shows the biomass capacity additions planned in Mindanao (Figure 6.8).

(5) Solar energy

Solar energy is one of the promising RE resources in Mindanao. Studies conducted by National Renewable Energy Laboratory (NREL) indicate that Mindanao Island has high potentiality of solar with an average amount of 5–5.5 kW/m^2/day (Figure 6.9).

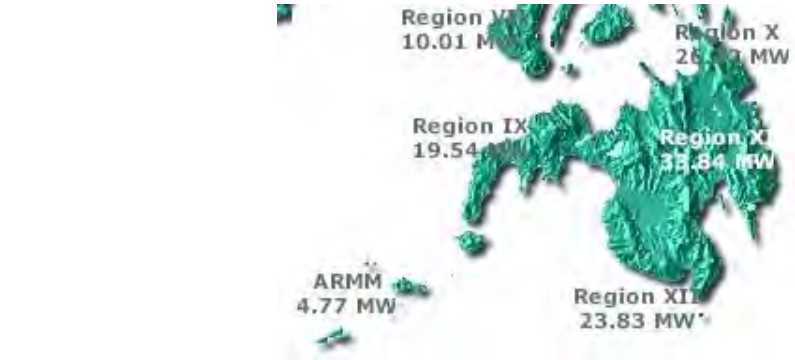
Mindanao has 17 solar potential sites, of which two sites are located in ARMM (Table 6.11). Their combined output is 37 MW accounting for 18% of the total estimated capacity in Mindanao. Costs of development of these projects are estimated to be PHP 2,918.64 million. The breakdown of solar potential sites in ARMM is shown in Table 6.12.

Table 6.10 Biomass Capacity Additions Planned in Mindanao, December 2013

Region	Plant	Location	Potential Capacity (MW)	Year Available	Pre-Development Investment Requirement* (Million PhP)
Committed					
ARMM	Philippine Trade Center, Inc.	Maguindanao	1.60	2015	-
	15 MW LPC Biomass Power Plant Project	Maguindanao	10.00	2015	-
Indicative					
X	12 MW Biomass Power Plant Project	Misamis Oriental	10.80	2015	928.80
	10 MW Kalilangan Bio-Energy Corporation Multi-Feedstock Power Generating Facility	Bukidnon	9.00	2015	774.00
	10 MW Don Carlos Bio-Energy Corporation Multi-Feedstock Generating Facility	Bukidnon	9.00	2015	774.00
	10 MW Malaybalay Bio-Energy Corporation Multi-Feedstock Generating Facility	Bukidnon	9.00	2015	774.00
Total			**49.40**		**3,250.00**

* *On the assumption that investment cost would require 2 million USD per MW*
Foreign Exchange Rate 43 PhP per USD

Source: DOE, MEP 204–2030.



Rice

Bagasse

Coconuts

Source: DOE website.

Figure 6.8 Distribution of Biomass Potential Resources in Mindanao

Source: NREL materials.

Figure 6.9 Distribution of Solar Potential in Mindanao

Table 6.11 Solar Potential Resources in Mindanao

Region	Location	No. of potential sites	Total estimated capacity (MW)
IX	Zamboanga Peninsula	3	21
X	Northern Mindanao	1	20
XI	Davao Region	2	45
XII	SOCCSKSARGEN	5	47
XIII	Caroga	4	31
ARMM	ARMM	2	37
Total		17	201

Source: DOE, Mindanao Energy Plan 2014.

Table 6.12 Solar Potential Resources in ARMM

Region	Location	Potential capacity (MW)	Pre-development investment requirement (PHP 10^6)
ARMM	Tawi-Tawi	2	172
	Marawi, Lanao Del Sur	35	3,010
Total		37	2,918.64

Source: ibid.

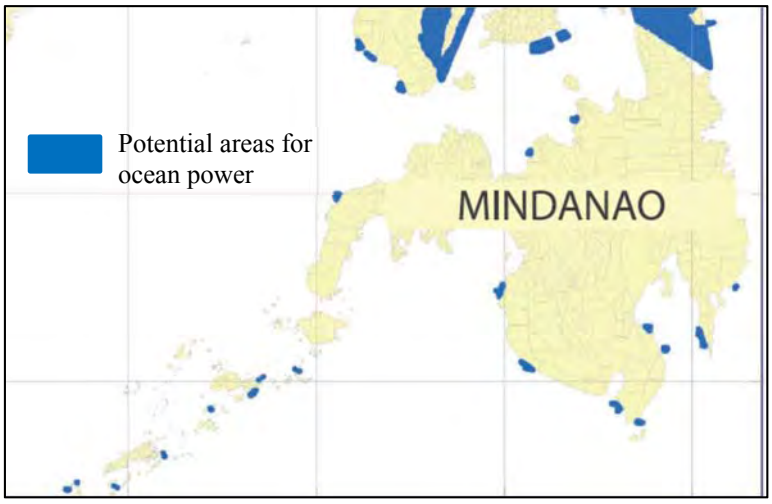
(6) Ocean energy

Ocean energy power generation is a method to harness RE such as ocean current, wave, tide, and a difference of sea water temperature. Mindanao has eight ocean energy potential sites identified with the total capacity of 24 MW, of which ARMM has five potential sites with a capacity of 8 MW (Table 6.13). Ocean energy potential sites studied in coastal areas of Mindanao Island and small neighboring Islands are shown in Figure 6.10. Table 6.14 shows the ocean energy potential resources by location in ARMM.

Table 6.13 Ocean Energy Potential Resources in Mindanao

Region	Location	No. of potential sites	Total estimated capacity (MW)
XII	SOCCSKSARGEN	1	1
XIII	Caroga	2	15
ARMM	ARMM	5	8
Total		8	24

Source: ibid.



Source: DOE, Renewable Energy Plans and Programs (2011–2030).

Figure 6.10 Mindanao Ocean Energy Potential Sites Studied

Table 6.14 Ocean Energy Potential Resources in ARMM

Region	Location	Potential capacity (MW)	Pre-development investment requirement (PHP 10^6)
ARMM	Tongkil, Sulu	1	7
	Sulu	2.5	17.5
	Tawi-Tawi	4.5	31.5
Total		8	168

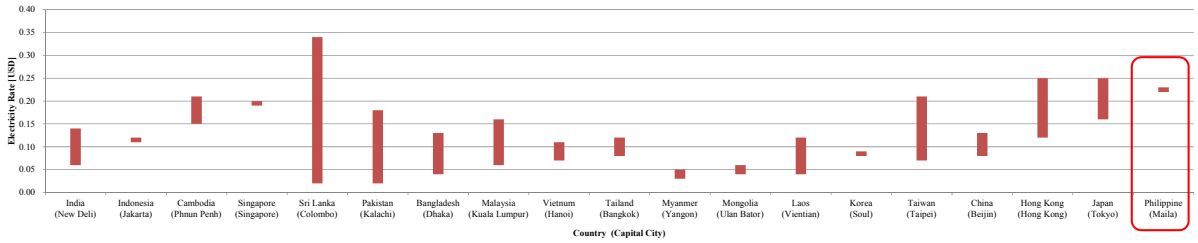
Source: ibid.

(7) Wind power

According to the investigation by NERL, the wind power potentials in Mindanao are lower than the ones in Luzon and Visayas. Mindanao has the highest wind power potential with the total capacity of 2,000 to 4,000 MW in the western coastal area of Mindanao Island. ARMM has wind power potential resources with a capacity of 100 to 1,000 MW, lower than in other regions. For the development of wind power, a small part of Region X and XIII in Mindanao is targeted.

6.1.7 Electricity tariff

The electricity tariff in the Philippines tends to be comparatively higher than in other Asian countries. Figure 6.11 represents electricity rate of each capital cities in the Asian countries based on the investigation conducted by Japan External Trade Organization (JETRO). The electricity rate in Sri Lanka is the highest, followed by Hong Kong and Japan. The electricity rate in the Philippines is the third highest and approximately US$0.22/kWh.

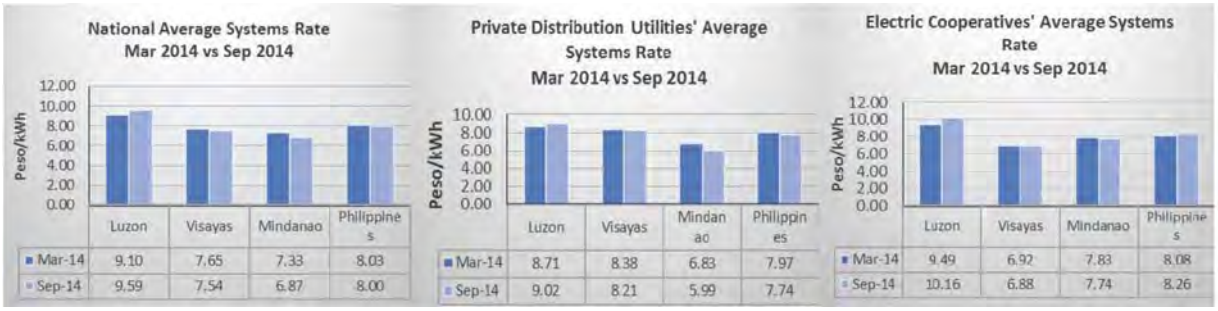


Source: JETRO website data.

Figure 6.11 Electricity Tariff by Capital Cities in Asian Countries

National average power systems rate, private distribution utilities' (DUs) average system rate, and electric cooperatives' (ECs) average rate as of September 2014 and March 2014 are shown in Figure

6.12. The national average system rate and the private DUs average system rate of, Mindanao have the lowest rates as of both March and September in 2014 among three major grids. Visayas has the lowest rate with regard to ECs average system rate. Table 6.15 shows ECs unbundled average effective residential electricity rates in June 2014. From the table, it is found that regarding ECs' average systems rate, Visayas has the lowest rate, while Mindanao has the lowest residential rate. Generation costs comprised approximately 50% of ECs' national average effective residential electricity rates. The generation cost in Mindanao is PHP 3.9615/kWh, the lowest among other grids. This is mainly attributable to the fact that about 50% of power demand in Mindanao is supplied by the AGUS hydro power plant which can generate the power at the lower cost.



Source: DOE, 25th EPIRA Implementation Status Report.

Figure 6.12 Average Electric System Rates

Table 6.15 ECs' Unbundled Average Effective Residential Electricity Rates, June 2014

(Unit: PHP/kWh)

Bill Subgroup	LUZON		VISAYAS		MINDANAO		NATIONAL	
	PhP/kWh	Percent share	PhP/kWh	Percent share	PhP/kWh	Percent share	PhP/kWh	Percent share
Generation	5.0897	50.09	5.6504	53.19	3.9615	45.57	4.9005	49.87
Transmission	1.0787	10.62	0.8658	8.15	1.0020	11.53	0.9822	10.00
System Loss	0.8765	8.63	0.9050	8.52	0.7162	8.24	0.8326	8.47
DSM[1]	1.6931	16.66	1.8190	17.12	1.6805	19.33	1.7309	17.62
RFSC[2]	0.3251	3.20	0.3459	3.26	0.4552	5.24	0.3754	3.82
Other Charges[3]	(0.0712)	(0.70)	0.0674	0.63	(0.1434)	(1.65)	(0.0491)	(0.49)
Subsidy Charges[4]	0.0654	0.64	0.0671	0.63	0.0830	0.95	0.0718	0.73
Universal Charges[5]	0.3159	3.11	0.3142	2.96	0.3350	3.85	0.3217	3.27
Other Taxes[6]	0.0812	0.80	0.0205	0.19	0.0642	0.74	0.0553	0.56
VAT	0.7067	6.95	0.5685	5.35	0.5388	6.20	0.6047	6.15
Total	**10.1611**	100.00	**10.6238**	100.00	**8.6930**	100.00	**9.8260**	100.00

[1] *Distribution, Supply and Metering Charges*
[2] *Reinvestment Fund for Sustainable CAPEX*
[3] *Loan Condonation & PEMC-SPA Charge*
[4] *Lifeline & Senior Citizen Subsidy/Discount*
[5] *Missionary Electrification, Environmental Charges, NPC Stranded Cost*
[6] *Local Franchise &Business Taxes, Real Property Tax*
Source: NEA

6.2 Power Sector Development Plan

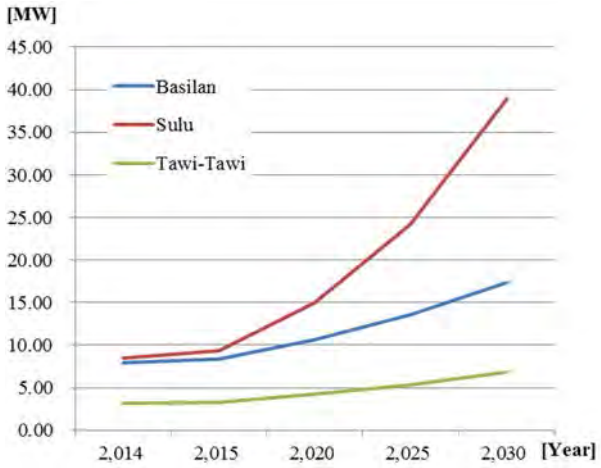
6.2.1 Demand forecast

(1) Total demand

Two demand projections, namely, Base Case and High Economic Target, are prepared by DOE. The base case demand forecast is obtained from the Distribution Development Plan (DDP) submitted by all distribution utilities in Mindanao, while the high economic target demand forecast is based on the regional gross domestic product (RGDP) target from the peace and development framework plan prepared by the Mindanao Development Authority (MinDA). In the case of the high economic target scenario, the growth rate of peak demand is expected to be around 12–14% during 2014-16. From

2017 onward, the peak demand growth rate is expected to be 8–10%. In the case of base case scenario, the growth rate of peak demand is estimated to be around 6–12% during 2014–16, and from 2017 onward, the growth rate of around 4–5% is expected.

In missionary areas such as Basilan, Sulu, and Tawi-Tawi, the peak demand is expected to substantially increase by the end of 2030. The projected peak demand for Basilan and Tawi-Tawi in 2030 is estimated to be approximately twice as much as the ones in 2014. Also, it is expected that the peak demand for Sulu in 2030 will reach 38.92 MW that is equivalent to 4.6 times as much as the one in 2014. Figure 6.13 shows the demand forecast for Basilan, Sulu, and Tawi-Tawi.



[Unit: MW]

Year / Islands	2014	2015	2020	2025	2030
Basilan	7.94	8.33	10.63	13.57	17.32
Sulu	8.47	9.32	15.01	24.17	38.92
Tawi-Tawi	3.15	3.30	4.22	5.38	6.87

Source: DOE, Mindanao Energy Plan 2014.

Figure 6.13 Demand Forecast for Basilan, Sulu, and Tawi-Tawi

(2) Energy demand by sector

Two scenarios, the high economic target scenario and base case scenario, are prepared by DOE for energy demand by sector in Mindanao. In both cases, the energy required for residential and industrial uses is expected to increase highly and almost equally. The second largest is the commercial use and agriculture use is the lowest. These scenarios are based on the current share and created by proportionally increasing energy consumption for each sector.

6.2.2 Power development plan

For the development of large-scale power plants connected to the grid, the investment by private capitalization is required since the Philippine Government cannot directly and strongly encourage private companies to install new power plants. This situation is due to the EPIRA designed for the introduction of competitive principal by private utilities that could consequently lead to electricity price reduction. After the EPIRA was enacted, however, the private investment has not been so activated as expected, and the Philippines are still being annoyed by chronic power shortages. Recently, the development of power facilities by large holding companies is being promoted and committed. Table 6.16 shows the committed new power plants in Mindanao.

Although, the situation of power shortages will be improved by the end of 2015 owing to the planned capacity addition committed, there is a possibility that the power shortages could occur again as far as the peak demand continues to grow. If the high economic target scenario or base case scenario can be realized, such a severe situation would appear in 2020 at the earliest and at latest, in 2024.

In the off-grid, the addition of small-scale power plants by NPC-SPUG is permitted. The diesel generators are easier to install technically, and cost of installation is smaller in the off-grid. Due to mechanical restrictions, however, some of these units cannot be run for 24 hours a day. Accordingly, it is difficult to be certain about steady power supply to the off-grid. By the end of 2030, installment of power generators, 10 MW in Sulu and 5 MW in Tawi-Tawi, is scheduled as presented in Table 6.17.

Table 6.16 Committed Projects for New Power Plants in Mindanao

Year	Name of Plants	Fuel Type	Capacity [MW]	Location
2014	Tuday 1 Hydro	Hydro	6.6	Sta.Cruz, Davao del Sur
	Tuday 2 Hydro	Hydro	7	Sta.Cruz, Davao del Sur
	MEGC Diesel	Diesel	15	Dalipuga, Iligan City
	PSI Bunker-Fired Power Plant	Diesel	20.9	Brgy.Apopong, General Santos City
	PSFI Bunder-Fired Power Plant	Diesel	5.2	San Francisco, Agusan del Sur
2015	Therma South Coal	Coal	300	Toril, Davao City and Sta.Cruz, Davao del Sur
	Puyo Hydro	Hydro	30	Jabonga, Agusan del Norte
	Southern Mindanao Coal	Coal	200	Maasim, Sarangani
	Kalilangan Biomass	Biomass	10	Maramag, Bukidnon
	Malaybalay Biomass	Biomass	10	Maramag, Bukidnon
	Don Carlos Biomass	Biomass	10	Maramag, Bukidnon
	LPC Biomass	Biomass	10	Maguindanao
2016	Lake Mainit Hydro	Hydro	25	Jabonga, Agusan del Norte
	FDC Misamis Coal	Coal	405	Villanueva, Misamis Oriental
2017	Limbatangon Hydro	Hydro	9	Cagayan de Oro City, Misamis Oriental
Total			1063.7	

Source: DOE, Mindanao Energy Plan 2014.

Table 6.17 Additional Power Capacity to Islands in ARMM

Year / Islands	2014	2015	2020	2025	2030	Estimated Investment Requirement [Million PhP]
Sulu	-	10	-	-	-	2,257.50
Tawi-Tawi	-	-	5	-	-	645
Basilan	-	-	-	-	-	967.5

Source: DOE, MEP 2014.

6.2.3 Transmission development plan

The transmission development plan (TDP) is prepared by NGCP and annually updated and published on their official website. All transmission development projects planned between 2016 and 2023 are shown in TDP 2013. The projects that could make a significant impact on ARMM are described below.

(1) Tacurong–Sultan Kudarat 138kV transmission line construction

This is the project that aims to improve the system reliability of supplying the power for Tacurong substation (S/S) and Sultan Kudarat S/S by newly constructing 138 kV transmission line (T/L), one circuit. Under normal conditions, the Sultan Kudarat S/S are served through Kibawe S/S. However, when the 138 kV line between Kibawe and Tacurong S/S is faulted or in preventive maintenance, Tacurong S/S can accommodate the loads of Sultan Kudarat S/S via long 69 kV transmission line with limited capacity. Therefore, some of the electricity end users have experienced frequent low voltage due to relatively long transmission line. In order to avoid this situation, this project is planned and targeting for completion in 2018.

(2) Agus 1-2 switchyard upgrading and rehabilitation

Currently, the Agus 1 and Agus 2 power stations are mutually connected through single circuit, 138 kV T/L with a length of 6km. When this line is faulted, the generator in the Agus 1 power station is shut down and the power supply is interrupted. In order to avoid this situation, new T/L between Agus 1 and Agus 2 is scheduled to be additionally constructed and completed in 2017. Also, this project includes the rehabilitation of auxiliary equipment such as circuit breakers at the Agus switchyard as replacement of aged facilities.

(3) Agus 5 switchyard upgrading and rehabilitation

The control devices and equipment of the switchyard connected to Agus 5 power station can be controlled from the control room shared by the operation room of Agus 5. In order to meet the unbundling policy regulated by the EPIRA and the NGCP internal regulation, new control room is planned to be established separately from the NPC facilities. Simultaneously, the related aged facilities are also scheduled to be replaced by the end of 2020.

(4) Others

Large-scale system reinforcement projects under consideration, which could indirectly benefit ARMM, are as follows:

1) Balo-i–Villanueva–Maramag–Bunawan 230 kV electrification project

   - Expected completion year: 2017
   - Project purpose: To improve the system stability and supply reliability by upgrading from 138 kV T/L to 230 kV T/L, which is called backbone line passing through the central part of Mindanao
   - Estimated invest requirement: Around PHP 2.4 billion

2) Leyte–Mindanao interconnection project (LMIP)

   - Expected completion target: Under examination
   - Project purpose: To improve the supply reliability and realize the power interchange by interconnecting Mindanao on-grid and Visayas on-gird, effective utilization of power reserves, and expansion of power wholesale market
   - Estimated investment requirement: Around PHP 34 billion (only for the Mindanao side)

6.2.4 Power distribution plan

(1) Distribution development plans by ECs and PIOUs

Expansion and rehabilitation plans of power distribution facilities called the Distribution Development Plan (DDP) are formulated by ECs and PIOUs. The plans formulated by ECs are submitted to DOE through NEA, and those by PIOUs are submitted to DOE directly. DOE compiles these expansion-and-rehabilitation plans and publishes these plans as DDP. In the DDP 2010–2019 compiled by DOE shows peak demand forecast of the power supplied by ECs and yearly budget required for enforcement of power supply facilities. However, it is hard to say that these plans of ECs in ARMM are properly formulated. Also, some of ECs do not submit development plans, and it is seen that some ECs are developing based only on short term plans. In the DDP 2010–2019, no EC in ARMM has the expansion plan of distribution facilities targeting years of 2015–2019.

Considering this situation, the JST has confirmed directly with MAGELCO if it has its own DDP for short and long terms. According to MAGELCO, the expansion and rehabilitation plans of distribution facilities for 2015–2017 were formulated as a short term plan as shown Table 6.18.

Table 6.18 MAGELCO Short-term Distribution Development Plan, 2015–2017

Power Distribution Facilities		2015	2016	2017
Sub-transmission Line 69 kV (km)	Expansion	32	40	30
	Replacement	1.4	0.5	-
Distribution Line13.2 kV (km)	Expansion (3-phase)	72	-	-
	Expansion (single phase)	275	-	-
	Replacement (3-phase)	147	-	-
Distribution Transformer (sets)	10 MVA	1	-	-
	5 MVA	1	1	-
	10 MVA Upgrading	1	-	-

Source: MAGELCO.

(2) Missionary Electrification Development Plan (MEDP)

In addition to DDP, the Missionary Electrification Development Plan (MEDP) is disclosed by DOE. MEDP is a plan to electrify remote areas and islands such as barangays and *sitio*s (enclave villages of barangays) located far from existing distribution network, and targeting areas to which extension of distribution lines is very difficult. The business operators to be responsible for implementing the electrification plan are stipulated by the EPIRA and prioritized as 1) distribution company with an un-electrified area in its franchise areas, 2) distribution company adjacent to the un-electrified area, 3) third business operator, and 4) NPC-SPUG.

(3) Progress of electrification

The electrification rate of DDP and MEDP is managed by DOE and disclosed on the DOE website, and the progress of electrification in ARMM is shown in Table 6.19.

Table 6.19 Progress of Electrification in ARMM (Disclosed on February 9, 2015)

Status	Year Approved	EC Franchise Area	Type of PJT	Province	No. of PJT Areas	Potential House Hold Benefeficiaries
Completed/For Inspection	2009	SIASELCO	Barangay & Sitio	Sulu	4	-
For Implementation/For Fund Release	2013	CASELCO	Barangay & Sitio	Tawi-Tawi	6	944
	2013	TAWELCO	Barangay & Sitio	Tawi-Tawi	13	750
	2011	TAWELCO	Barangay & Sitio	Tawi-Tawi	3	-
Ongoing Implementation	2012	LASURECO	Rehabilitation	Lanao Del Sur	3	-

Source: DOE website.

6.3 Development Issues in Power Sector

6.3.1 Power shortages

In Mindanao, the power demand exceeds power supply capability as of January 2015. The data on the demand and supply balance such as forecasted peak demand, power supply capability and reserve capacity are disclosed on the NGCP website at 4:00 in the early morning on a daily basis. The data show that the reserve capacity is secured at more than 13% in Luzon and 6% in Visayas through one week, while the reserve capacity in Mindanao indicates negative values or almost zero through one week. Under the power shortage condition, the load curtailment (scheduled power outage) is implemented to keep the demand and supply balance.

The demand and supply profile of MAGELCO on weekday in October, 2014 shows actual power supply was only 4 MW for the peak demand of 10 MW at around 9:00PM. This means, remaining 6 MW was interrupted as load curtailment. It is found that the load curtailment quantity to be implemented was changing hour by hour and it was implemented from around 6:00AM to 24:00PM. In other words, this is the situation where no power was supplied in more than half of franchise area of MAGELCO during day time and even after sunset.

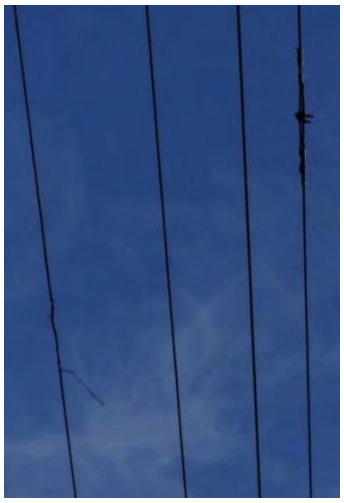
6.3.2 Aged distribution facilities

In ARMM, many power distribution facilities are extremely aged (Photo 6.2). Most of poles of distribution lines of MAGELCO were constructed between the 1970s and the 1980s, and wooden poles with cracks on the surface and corrosion at the bottom are frequently observed. Furthermore, those wooden poles with supporting post and line conductors with strand cutting are also frequently observed. From the observation, it was found that improper maintenance and repair have been commonly made, resulting in reoccurrence of conductor cutting and collapse of poles, and causing also increase in distribution losses.

Due to these aged distribution and substation facilities, serious power outages attributed to the system faults and equipment troubles might be caused. For the realization of stable power supply, urgent replacement of these facilities and establishment of proper operation and maintenance management

system are required. ECs are non-profitable entities, and almost all ECs in ARMM have financial problems. Therefore, they have difficulty in improving their distribution and substation facilities on their own and consequently, it leads to unhealthy conditions. In almost all ECs in ARMM, each expense is surpassing earning and only SIASELCO is achieving a primary surplus in 2012 and 2013. Since the remaining ECs are in deficit, urgent administrative improvement for each EC is required.

Very old and leaning wooden pole of distribution line with supporting post



Strand cutting of line conductor with improper repair

Power transformer without nameplate (year of manufacture, etc. are unknown)

Photo 6.2 Aged Distribution Line Facilities of MAGELCO

6.3.3 High distribution loss rates

According to the performance assessment of ECs conducted by NEA, distribution loss rates for ECs are reported as follows: MAGELCO 42.9%, BASELCO 40.7%, SULECO 32.0%, TAWELCO 29.4%, and LASURELCO 17.9%. These values are classified as a high rate compared to rates in other Southeast Asian countries with the average rate of 12–15%.

Distribution loss is classified into two categories. One is a technical loss and the other is a non-technical loss. Technical loss means an electric loss such as a heat loss which is generated by flowing current inside line conductors. Non-technical loss means a loss mainly due to the uncollectible electric tariff. The high loss rates in ARMM are due mainly to the uncollectible electric tariff, leading to financial difficulty and deficit operation of ECs. The main causes of low tariff collection rates are: 1) broken kWh meters, 2) utilization of used kWh meters with low accuracy, and 3) illegal connections of service wire, known as pilferage (Photo 6.3). As an example of power sales by MAGLECO, power purchase is 2,895,668 kWh and power sale is 1,626,863 kWh in October 2014. Accordingly, the power loss and loss rate are calculated as 1,247,087 kWh and 43.07%, respectively.

Broken kWh Meter

Illegal connection (indicated by arrow)

Photo 6.3 kWh Meters Installed in MAGELCO Franchise Area

(4) Low level of electrification

The level of electrification in ARMM remains quite low. Table 6.20 presents the electrification rates in franchise areas of ECs in ARMM. From the table, it appears that practically all the barangays have been electrified. On the other hand, connection rates at the sitio level vary and they are generally low. This seemingly high level of electrification in the barangays is due to the loose definition of electrification: If distribution lines pass through a barangay, the barangay is regarded as ready to connect service wires to its residents and thus electrified.

Table 6.20 Electrification Rates in ECs' Franchise Areas in ARMM (December 31, 2014)

ECs	MUNICIPALTIES/CITIES		BARANGAYS				SITIOS				CONNECTIONS		
	Coverage/ Energized	%	Potential	Energized/ Completed To Date	%	Unenergized	Potential	Energized/ Completed To Date	%	Unenergized	POTENTIAL	SERVED TO DATE	%
TAWELCO	9	100	186	186	100	0	344	200	58	144	47,000	12,498	27
SIASELCO	2	100	66	66	100	0	75	31	41	44	13,000	4,067	31
SULECO	16	100	330	330	100	0	81	62	77	19	85,000	25,295	30
BASELCO	14	100	269	269	100	0	220	105	48	115	75,000	39,964	53
CASELCO	2	100	17	17	100	0	26	0	0	26	5,000	1,961	39
LASURELCO	41	100	1,175	1,175	100	0	68	68	100	0	138,000	56,357	41
MAGELCO	30	100	404	398	99	9	1,245	497	40	748	116,000	27,485	24
Total	114	100	2,447	2,441	99	9	2,059	963	47	1,096	479,000	167,627	35

Source: NEA.

6.4 Policy Recommendation for Power Sector

As stated in Section 6.3, the critical issues in the Bangsamoro's power sector are classified into (1) power supply shortages, (2) aged distribution facilities, (3) high distribution loss rate, and (4) low electrification rate. In order to effectively address these issues and accelerate the development of Bangsamoro area, the following action plans and power policy are recommended.

6.4.1 Recommended action plans

(1) Actions for power supply shortages

As stated in Section 6.3, the power shortage in Mindanao is one of critical issues in the power sector and the load curtailment is being conducted almost every day in accordance with the rule that the areas and regions where there are lots of residents not paying electric tariff are targeted for the load shedding. This means that ECs having low rates of tariff collection and poor financial status are targeted for the load shedding. Therefore, it is required to improve ECs' financial status by improving this low rates of tariff collection so that ECs in the Bangsamoro region are excluded from the target of the load curtailment. In order to realize this situation, the following actions are effective:

1) To establish the strict rule of the tariff collection and strict disconnection and reconnection policy,
2) To replace aged/broken kWh-meters to new ones with accuracy and implement accurate meter-reading,
3) To promote awareness campaign to power consumers regarding tariff payment, and
4) To prevent illegal connections by regular monitoring

One of ECs in the Bangsamoro region, MAGELCO has already been introducing and implementing some activities mentioned above. Similarly, it is desirable for other ECs to introduce these counter measures against the illegal connections.

In order to tackle with the power shortages, it is also effective to introduce additional power facilities such as small power plants and power resources with renewable energy and connect to the distribution grid. Since ECs are not permitted to introduce and own generators due to the regulation of power sector, new power producers as IPPs are required and it is essential to make an effort to attract investors into the power sector in Mindanao.

(2) Action for aged distribution facilities

The rehabilitation and expansion program in the franchise area of MAGELCO, which has been well prepared, should be implemented immediately to improve its financial status. MAGELCO plays an important role for supplying the power for the central area of Bangsamoro. The rehabilitation and expansion of distribution lines and substations contribute to the reduction of technical losses, and replacement of kWh-meters can decrease non-technical losses. These measures combined will lead to the increase of billing amount.

The following actions by ECs can be recommended:

1) To secure own budget by requesting NEA for financial assistance, and
2) To request international donors for financial and technical assistance.

Furthermore, for the ECs in islands provinces, the following procedures are recommended:

1) To study current status of existing facilities, and
2) To prepare EC's own rehabilitation and expansion program.

It is noted that MAGELCO has introduced computerized on-line receipting system of the member-consumers' payment on January 7, 2015 and it is achieving notable results as regards the improvement of the tariff collection rate.

(3) Action for high distribution loss rates

Distribution losses include both technical and non-technical losses, and the technical losses can be improved by rehabilitation and expansion of distribution facilities using proper conductor size and proper line configuration and suitable transformer capacity. Non-technical losses are mainly due to 1) low accuracy of kWh-meters, 2) un-metering including illegal connection, and 3) bill collection method. Therefore, to reduce non-technical losses, the same measures as the action plans recommended for the power shortage should be undertaken.

(4) Action for low electrification rate

As mentioned in Section 6.3, barangays of all the ECs have been recorded to be electrified. However, the connection rates to customers are as low as 24% to 53%. Therefore, ECs including MAGELCO have to enhance and expedite electrification programs. The following actions are recommended:

1) To promote public relations (PR) activities,
2) To secure own budget by requesting NEA for financial assistance, and
3) To request international donors for financial and technical assistance.

The relationships among four issues of action plans, the expected results and actions to be done are shown in Figure 6.14.

6.4.2 Recommended power policies

The recommended power policies intended for the new Bangsamoro autonomous government are described hereunder.

(1) Empowerment of Bangsamoro government to develop power sources

The power supply is requisite for the economic growth and various existing industries in the modern society. In Mindanao, and even in other regions of the Philippines, the frequent power shortages are annoying the public and enterprises. According to the EPIRA, the development of power sources is entrusted mainly to the private sector and investors/developers.

However, in order to facilitate and achieve rapid economic growth in the Bangsamoro region, it would be necessary and effective not to rely too much on the private sector to avoid risk such as sudden termination of the construction work due to unforeseen situations, but to promote and develop power by the Bangsamoro autonomous government itself and/or the new governmental organization to be established in the Bangsamoro autonomous government that has a responsibility of power development.

Therefore, the Bangsamoro government needs to have the authority of developing power sources.

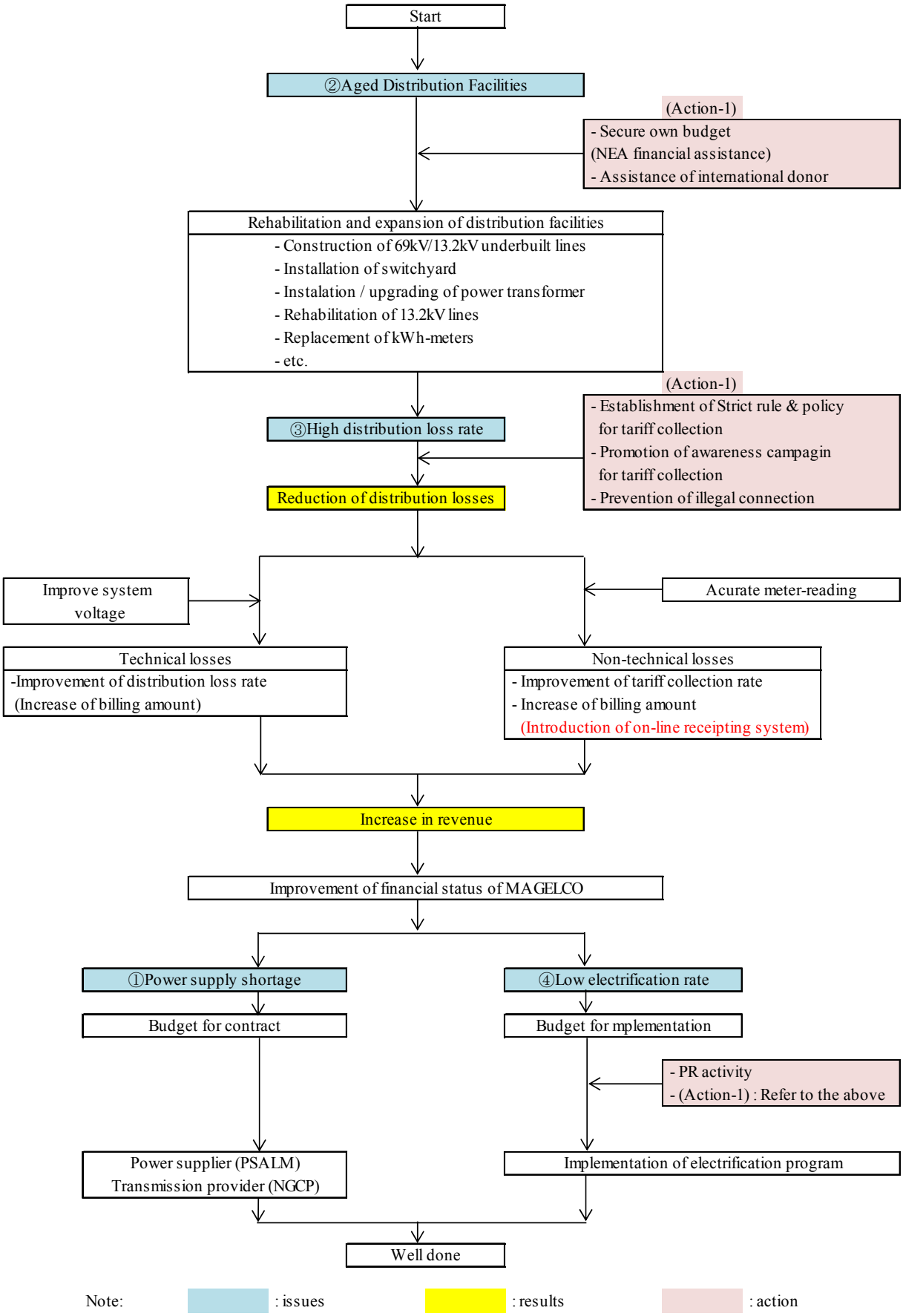


Figure 6.14 Procedure for Improvement of Bangsamoro Power Sector

At present, since the power sector in the Bangsamoro is under an effect of the EPIRA, it is recommended to coordinate with ERC to discuss the future structure of the Bangsamoro power sector and coverage of the EPIRA. The development of power sources should be undertaken by the initiative of the Bangsamoro governmental organization.

(2) Establishment of proper FIT prices

The feed-in-tariff (FIT) system is known as an effective measure to expedite the introduction of renewable energy in the world. In the Philippines, this system has already been introduced and is functioning properly. However, a lower rate of the FIT has a possible obstacle to investors who try to invest and develop renewable energy resources. In order to attract such kinds of investors and private companies to the Bangsamoro region, it is recommended to properly raise FIT rates for renewable energy in Mindanao. However, it may increase the burden on tariff payers as it may lead to a rise of electric tariff. The key is to adequately and strategically set up specific FIT prices in consideration of the economic level of Bangsamoro in cooperation with DOE, ERC and other related organizations.

(3) Integration of ECs in ARMM area

For effective management, it would be worth considering the possibility of integration of seven ECs in ARMM as one distribution utility in the Bangsamoro region. It would make it possible to effectively manage the power distribution business and comprehensively plan for the development of the distribution network, considering the entire development of the Bangsamoro region.

Introduction of capacity development system to Bangsamoro government

Even if the organization or ministry that can handle the power sector is newly established in the Bangsamoro government, it would take some time for the Bangsamoro government itself to properly control the power sector. For a specified period of time, the management of the power sector in the Bangsamoro region may be undertaken effectively based on the cooperation and of the Philippine Central Government particularly for capacity development of the Bangsamoro power sector.

CHAPTER 7 PEACE-BUILDING PERSPECTIVE OF BANGSAMORO DEVELOPMENT

7.1 Toward Social Cohesion in Bangsamoro

Cross-cutting issues that have been identified in the Bangsamoro Development Plan Phase 1 (BDP I) are discussed in this chapter. They include specifically the issues of gender, youth, other vulnerable groups, and peace-building. In particular, emphasis is placed on issues/factors that may have a significant implication for peace-building in war-torn Bangsamoro, so that conflict sensitivity is incorporated in the BDP Phase 2 (BDP II).

Implication of the legacy of decades of conflict may be found in the recent trend of violence in Bangsamoro. The signing of the Comprehensive Agreement on the Bangsamoro (CAB) between the Government of the Philippines and the Moro Islamic Liberation Front (MILF) in 2014 was a significant step in reducing vertical conflict[1], but horizontal conflict[2] remained a significant issue for sustainable peace in the region. Although violence instigated by groups such as the Bangsamoro Islamic Freedom Fighters (BIFF) and the Abu Sayyaf Group (ASG)[3] remains a threat to vertical stability of the Bangsamoro, daunting realities of horizontal conflicts on the ground, calls for the greater attention to horizontal inequalities and tensions that emerge from them. These are the new and important signifiers of violence.[4] Specifically, horizontal conflicts related to local elections, turf wars between armed groups, clan feuding (or *rido*) as well as so-called shadow economy, have growingly become a serious concern for peace-building in the Bangsamoro.

A cohesive society simultaneously displays an active vertical and horizontal interplay.[5] To strengthen social cohesion, different sets of social capital, i.e. norms, values and social relations that bond communities together (such as kinship, ethnicity and religion) may need to be bridged horizontally, whereas civil society and the state also needs to be actively bridged on the vertical axis. Thus, without reconstructing fragmented or fraying social relations, a merely economy-centered and top-down development approach, which often can create winners and losers in the process, may only further promote individual and community distrust. In the worst-case scenario, it might reignite violent conflict given the proliferation of weapons and the prevailing gun culture in the Bangsamoro.

Multiple dimensions of violence in the Region further complicate the situations. For example, political issues can fuse with shadow economy and inter- and intra-clan violence, clan feuding instigated by land disputes, business competitions, etc. can quickly shape into intra/inter insurgent violence.

Thus, any development initiative in the Bangsamoro should never lose sight of complex interplay between politics, culture, identity, economy (both real and criminal elements), and also address not only vertical relationships, but also horizontal relationships among different socio-political groups. Through such holistic and conflict-sensitive approach, the BDP essentially has to address the needs and aspirations of ordinary Bangsamoro people, and contribute to political and socio-economic transformation within the Bangsamoro.

7.2 Cross-cutting Issues and Their Implications for Development and Peace-building

This section focuses on some major issues that require careful attention in view of sustainable peace-

[1] Vertical conflict: insurgency-related, separatist or non-separatist armed struggles against the State, including terrorist actions (International Alert 2014)
[2] Horizontal conflict: violent struggles between clans, ethnic groups, rival insurgent factions, political parties and private armed groups or shadow authorities for control over land, natural resources, elective and non-elective positions, including government resources and rents (International Alert 2014).
[3] The ASG is said to have pledged allegiance to the Islamic State of Iraq and Syria (ISIS)
[4] International Alert (2014): Rebellion, political violence and shadow crimes in the Bangsamoro
[5] Colletta, N. J., & Cullen, M. L. (2000). Violent conflict and the transformation of social capital: Lessons from Cambodia, Rwanda, Guatemala, and Somalia (Vol. 795). World Bank Publications.

building and development within the Bangsamoro.[6]

7.2.1 Land-related issues

Land-related issues, specifically the persistence of land-based conflict and the inability to undertake an effective land reform have significant implication both for vertical and horizontal conflict in the Bangsamoro.[7] The typologies suggested by the report of World Bank and the IOM[8] clearly indicate the multi-dimensionality of land-related conflict in Mindanao as shown below.

- Land conflicts between Moro and Christian parties related to past forced displacement
- Conflicts between IP parties against Moro or Christian parties relating to a primacy of rights
- Inter-clan and community-based rido related to competing land claims
- Land disputes that escalate into a vertical conflict between the government and armed groups
- Competing claims between public institutions and private parties

The roots of such land-related issues/conflicts in Mindanao can be dated back to the period under the Spanish colonial rule in the 19th century. So-called *Regalian doctrine* introduced by the Spaniards into the Philippines denotes that "all lands of the public domain belong to the State", and that the State is the source of any asserted right to ownership in land and charged with the conservation of such patrimony.[9] In particular, the Royal Decree of 1894 (the Maura Law), which arrogated to the state the power to deny legal recognition of customary property rights, is said to have provided the legal foundation for the existing state land property policy: it was in total contradiction to traditional communal property ownership practices in Mindanao.[10] Although the Spanish ruler failed to subdue the Mindanao and Sulu territories, the Treaty of Paris in 1898 declared all lands vested in the Spanish crown to become the property of the United States.[10]

The US colonial rule continued to use the Regalian doctrine as the basis of all public land laws it imposed, and did not recognize communal landownership. In particular, Act No. 496, or the Land Registration Act of 1902 placed all public and private lands under the Torrens system, and the person or corporations are required to obtain an Official Certificate of Title (OCT), or the *Torrens title* to prove the ownership of the property.

For Moro and other indigenous communities, the very matter of registration was totally alien to them, and limited literacy among those populations have further prevented them from complying with the system. [9] [11] Moreover, there was no room for registration of communal lands under the American system. Subsequently, the Public Land Act of 1905 declared all previously unregistered lands were to become public lands under the administration of the state, and the Cadastral Act in 1913 has made all surveys compulsory to all landowners.[12] Many Moros took the cadastral survey as a device of imposing taxes upon them, simply abandoning their lands and moving to other areas, or selling their lands away to settlers for nominal payments.[13]

During the years of the Commonwealth Period (1935–1946), the U.S. undertook a *Filipinization* policy, and migration from Luzon and Visayas to the Mindanao was encouraged.[10] In addition, a communist-inspired rebellion asking for land reform caused important armed conflicts in many parts of Central

[6] Analysis in this section is derived from different research documents as well as a series of interview with different stakeholders related to the particular issues.
[7] Lara Jr, F. J., & Champain, P. (2009). Inclusive peace in Muslim Mindanao: Revisiting the dynamics of conflict and exclusion. *International Alert*.
[8] Land Disputes in Conflict Affected Areas of Mindanao: Report of the Joint World Bank- International Organization for Migration Scoping Mission: https://www.iom.int/files/live/sites/iom/files/What-We-Do/docs/Land-Disputes-in-Conflict-Affected-Areas-of-Mindanao.pdf
[9] Land Tenure Stories in Central Mindanao Local Governance Support Program in ARMM, 2009
[10] Fianza, M. (2004, August). Contesting land and identity in the periphery: the Moro Indigenous People of Southern Philippines. In Commons in an Age of Global Transition: Challenges, Risks and Opportunities, the Tenth Conference of the International Association for the Study of Common Property, Oaxaca, Mexico (pp. 9-13).
[11] Rodil, B. R. (1994). The minoritization of the indigenous communities of Mindanao and the Sulu Archipelago. Alternate Forum for Research in Mindanao, cited in Vellema, S., & Lara Jr, F. (2011).
[12] Pelzer, K. J. (1945). Pioneer settlement in the Asiatic tropics. Cited in Fianza, M. (2004, August).
[13] Stewart, J. C. (1977). People of the flood plain: the changing ecology of rice farming in Cotabato, Philippines (Doctoral dissertation). Cited in Fianza, M. (2004, August).

Luzon after the World War II.[14] To deal with the rebels' demand for land, the central government carried on promoting the migration to Mindanao even after the initial rebel groups were settled.[15]

The fact that less than 17% of Mindanao territory is currently occupied by the Moro people, much of it desolate and barren lands situated in far-flung highlands, may testify the legacy of accelerated dispossession of Moro during the Commonwealth period.[9] The consequence of the US land policy and such migration rush also have shifted political power from the Moro to the Christian migrants in some areas.[10] Consequently, traditional leaders such as the Datus lost the power to exercise their customary right of landownership,[16] which further exacerbated land dispossession among Moros and other indigenous population.

(1) Current land-related mechanism and institutions

It is argued that the Regalian doctrine provided the basis for the Philippine state to declare lands of the public domain as inalienable and indisposable.[10] To this effect, the current Constitution of the Philippines stipulates, for example, "[a]ll lands of the public domain, waters, minerals, coal, petroleum, and other mineral oils, all forces of potential energy, fisheries, forests or timber, wildlife, flora and fauna, and other natural resources are owned by the State. With the exception of agricultural lands, all other natural resources shall not be alienated. The exploration, development, and utilization of natural resources shall be under the full control and supervision of the State" (XII section 2[17]). The Land Registration Act of 1902 was updated in 1978, and the Presidential Decree No. 1529 in 1978, or the Property Registration Decree, which aims to strengthen the Torrens System, is the principal law currently governing land registration in the Country.[18]

Different government agencies are involved in land management in the Philippines. Often each issue different documents related to land ownership. The total land area of the Philippines is about 30 million ha, half of which is classified as forestlands, 47% as alienable and disposable lands, and the remaining 3% as unclassified forestlands.[19] The Department of Environment and Natural Resources (DENR) is to delineate public lands and issue free, homestead and sales patents to those classified as alienable and disposable (A&D).

The Land Management Bureau (LMB) of DENR administers the distribution of public alienable and disposable lands using patents, whereas the Forest Management Bureau (FMB) of DENR issues title on forestland: a) Community Based Forest Management Agreement (CBFMA) that allows forest-based communities to use and develop forestland and resources and b) an Integrated Forest Management Agreement (IFMA) that is an agreement entered into jointly by DENR and a private partner for industrial forest exploitation.[8] Once the titling process is complete by DENR, a copy of the mother title is deposited with the Register of Deeds (ROD) of the Land Registration Authority (LRA). While DENR and LRA have offices at the regional and provincial level, as well as in selected larger municipalities, they do not necessarily coordinate.[8]

In the ARMM comprising a major area in the future Bangsamoro core territories, LMB issues free and miscellaneous sales patents; the former covers agricultural lands measuring not more than 12 ha, and the latter is for residential lots of up to 1,000 m^2 and commercial and industrial sites of more than 1,000 m^2. Application of those patents involve different players such as the Community Environment and Natural Resources Officer (CENRO), the DENR officer at the barangay and municipal level, the Provincial Environment and Natural Resources Officer (PENRO), the director of LMB, and the DENR-ARMM Secretary, the Registry of Deeds.

As a rule, an applicant will only pay a PHP 50 filing fee but because LMB is sorely underfunded, the

[14] Kerkvliet, B. (1977). The Huk Rebellion. Berkeley.
[15] Paderanga Jr, C. W. (1987). A Review of Land Settlements in the Philippines 1900-1975. Philippine Review of Economics, 24(1 & 2).
[16] Vellema, S., & Lara Jr, F. (2011). The agrarian roots of contemporary violent conflict in Mindanao, Southern Philippines. Journal of Agrarian Change, 11(3), 298-320.
[17] The Constitution of the Republic of the Philippines: http://www.gov.ph/constitutions/1987-constitution/#article-xii
[18] Presidential Decree No. 1592: http://www.lawphil.net/statutes/presdecs/pd1978/pd_1529_1978.html
[19] Department of Environment and Natural Resources: http://www.denr.gov.ph/index.php/component/content/article/55.html

applicant will, in actuality, be forced to shoulder the expenses of the investigator and a surveyor.[20] Besides limited funding of DENR to complete the cadastral surveys,[21] it is argued that local government officials are reluctant to cooperate with such surveys because of the fear that their area of jurisdiction will be reduced, thus so will their internal revenue allotment (IRA).[9] In a similar way, land occupants are also afraid that surveying and titling of lands may trigger, rather than resolve, further conflicts within families and communities.[9]

Meanwhile, the Department of Agrarian Reform (DAR) redistribute private lands and some government owned lands under the Comprehensive Agrarian Reform Program (CARP). The CARP, established in 1988 under the Comprehensive Agrarian Reform Law (CARL), aims at the redistribution of public and private agricultural lands to landless farmers and farmworkers, irrespective of tenurial arrangement. It envisions an equitable national land ownership with empowered agrarian reform beneficiaries who can effectively manage their economic and social development to have a better quality of life.[22] Accordingly, DAR issues emancipation patents (EP) for rice and corn lands and the Certificate of Land Ownership Award (CLOA), which is registered with the Registry of Deeds.

DAR also works closely with DENR in identifying areas for distribution, as most lands distributed are under the public domain category.[8] DAR has various modes of distributing lands including compulsory acquisition, Voluntary Offer to Sell (VOS), as well as Voluntary Land Transfer (VLT). For example, the VOS aims to encourage landowner and cooperation by giving them incentives (such as additional cash payment with corresponding decrease of bonds payment), whereas the VLT is a land transfer transaction directly between the landlord and peasants with the government's facilitation.[8]

Although many landless farmers may have benefited by the CARP, it is argued that the CARP has inherent theoretical and empirical limitations in the context of the Mindanao.[16] Specifically, top priority under the CAPR scheme is given only to those who are actually working the land at the time of the CARP process. It does not account for original occupants who may have a prior claim over the land, and thus it works against the claims of many Moro and other indigenous populations.[23] In fact, the CARL refers to ancestral lands in Section 9: "ancestral lands of each indigenous cultural community shall include, but not be limited to, lands in the actual, continuous and open possession and occupation of the community and its members: Provided, That the Torrens Systems shall be respected". Thus, it is argued that they are not entitled to reclaim their lands. In effect, their dispossession was thus formalized and institutionalized by the CARP by redistributing their lands to other poor social classes, including Christian farmers.[16]

In reality, the CARP's accomplishment in the ARMM was only 55% by 2007; nearly half of the reported accomplishment was in government-owned land (which represents only 30% in the region), and that in private agricultural land is only 30%.[16] A further problem has been the VSO scam, a form of corruption, wherein the government has been made to pay for fictitious lands transacted.[16] Following the scam, DAR has substantially reduced land transfer operations, and as a result, land titles have lost their value in rural land markets.[24]

Some even point out the CARP, in fact creates the reverse effect from its original purpose in Mindanao where land ownership is often clan-based.[25] For instance, complying with the CARP, the large agricultural multinational companies redistribute the land to the workers, and the workers (or their co-operatives) then engaged in a leaseback arrangement.[16] In the process, a clan leader can consolidates the land of an entire clan and lease it to the investors. While some of the small land owners are hired

[20] Gulane, J. (2013). Informal land markets and conflict in Maguindanao. In Out of the Shadows: Violent Conflict and the Real Economy of Mindanao (pp. 145-196). International Alert London.
[21] The Cadastral Survey is a survey covering an entire municipality or city consisting of several or many parcels of land undertaken for the purpose of title clearance and land registration. Cadastral Act 2259 aims at quieting title to any land within a particular area by way of compulsory registration proceedings and thus minimizing land conflicts (Land Tenure Stories in Central Mindanao Local Governance Support Program in ARMM, 2009)
[22] the Comprehensive Agrarian Reform Law: http://www.dar.gov.ph/ra-6657-what-is-carp-comprehensive-agrarian-reform-program
[23] Gutierrez, E., & Borras, S. M. (2004). The Moro conflict: Landlessness and misdirected state policies.
[24] Policy brief, April 2014, Land Governance in the Bangsamoro, International Alert
[25] Salerno, T. (2011). Transnational Land Deals in Mindanao: Situating Ambivalent Farmer Responses in Local Politics.

back to work on the land for a wage, the investors only have to deal with the elite of the clan as the representative. Concerns over such an arrangement are where the less powerful members of the communities will stand in such deals, how much their voices will actually be heard throughout the process, and, their level of acceptance to lease their land.[25] Contrary to the original purpose of the CARP, in realities, such processes could reinforce monopoly over the land, rather than mitigate it as initially envisaged.

(2) Ancestral domain related issues

With regard to land management of indigenous population (IP), the National Commission on Indigenous People (NCIP), established under Republic Act No. 8371, or the Indigenous Peoples Rights Act (IPRA)[26] of 1997, has the authority to delineate and designate as Ancestral Domain (AD)[27] in the Country.[28] NCIP issues Certificate of Ancestral Domain Claim (CADC) to the claimant IP group, and then Certificate of Ancestral Domain Title (CADT)[29] upon further validation of the claim. It also issues Certificate of Ancestral Lands Title (CALT)[30] for the Ancestral Lands[31], regardless of its existing classification and use and regardless of whether it is considered alienable or disposable under land laws.[32]

The IPRA does not specifically include the Moros, because they did not categorize themselves as an indigenous people during the preparation and enactment of the IPRA. However, NCIP said that Moro can still avail of CADTs if they choose. Confirming this, a CADT has been issued to the Sama-Bangingi tribe in Lantawan, Basilan.[9] In general, the issuance of the CADTs and CALTs has been very slow as it requires coordination between different agencies such as DENR, DAR and NCIP. In the ARMM, NCIP does not have a presence, but the Office of Southern Cultural Communities, OSCC represents IPs. Moreover, some aspects of the IPRA are in conflict with other legislations such as the National Integrated Protected Areas System Act[33], the Mining Act, the CARP, and others such as the Local Government Code, which delegates the power to approve development plans to local government units.[34] [32] LGUs also perceive ancestral domain claims as loss of territory, and, therefore, loss of revenues from IRA.[35]

In particular, the Mining Act of 1995[36], following the Regalian doctrine, stipulates that "all mineral resources in public and private lands within the territory and exclusive economic zone of the Republic of the Philippines are owned by the State. It shall be the responsibility of the State to promote their

[26] http://www.gov.ph/1997/10/29/republic-act-no-8371/
[27] Ancestral Domains — Subject to Section 56 hereof, refer to all areas generally belonging to ICCs/IPs comprising lands, inland waters, coastal areas, and natural resources therein, held under a claim of ownership, occupied or possessed by ICCs/IPs, by themselves or through their ancestors, communally or individually since time immemorial, continuously to the present except when interrupted by war, force majeure or displacement by force, deceit, stealth or as a consequence of government projects or any other voluntary dealings entered into by government and private individuals/corporations, and which are necessary to ensure their economic, social and cultural welfare. It shall include ancestral lands, forests, pasture, residential, agricultural, and other lands individually owned whether alienable and disposable or otherwise, hunting grounds, burial grounds, worship areas, bodies of water, mineral and other natural resources, and lands which may no longer be exclusively occupied by ICCs/IPs but from which they traditionally had access to for their subsistence and traditional activities, particularly the home ranges of ICCs/IPs who are still nomadic and/or shifting cultivators;
[28] According to NCIP, IP communities claim approximately 10 million hectare as AD.
[29] CADT refers to a title formally recognizing the rights of possession and ownership of ICCs/IPs over their ancestral domains identified and delineated in accordance with this law;
[30] CALT refers to a title formally recognizing the rights of ICCs/IPs over their ancestral lands
[31]Ancestral Lands — Subject to Section 56 hereof, refers to land occupied, possessed and utilized by individuals, families and clans who are members of the ICCs/IPs since time immemorial, by themselves or through their predecessors-in-interest, under claims of individual or traditional group ownership, continuously, to the present except when interrupted by war, force majeure or displacement by force, deceit, stealth, or as a consequence of government projects and other voluntary dealings entered into by government and private individuals/corporations, including, but not limited to, residential lots, rice terraces or paddies, private forests, swidden farms and tree lots;
[32] Knack, P. D. (2013). Legal frameworks and land issues in Muslim Mindanao. Land and Post-conflict Peacebuilding, Jon Unruh & Rhodri Williams (eds.), Earthscan, 451-474.
[33] http://www.gov.ph/1992/06/01/republic-act-no-7586/
[34] http://www.psdn.org.ph/chmbio/ra7942.html
[35] Quitoriano, E. L. (2009). Land, foreign aid and the rural poor in Mindanao. Focus on the Global South Research Report, 6.
[36] http://www.psdn.org.ph/chmbio/ra7942.html

rational exploration, development, utilization and conservation . . ." While it also states that "the state shall recognize and protect the rights of the indigenous cultural communities to their ancestral lands as provided for by the Constitution (Section 4)", and "no ancestral land shall be opened for mining operations without the prior consent of the indigenous cultural community concerned (Section 16)", it states that it excludes the area whose property rights existed before the IPRA, from ancestral domains, thus mining companies licensed under the 1995 Mining Act can continue to operate legally in these domains despite opposition by indigenous peoples.[35] Critiques of the IPRA also claim that it may facilitate privatization of land that has previously been held under customary tenure, which would enable foreign companies to more easily obtain ancestral land, and would sow disunity within communities.[37]

(3) Challenge for BDP

As mentioned previously, land-related issues/disputes are considered on major dimension of violent conflict in Bangsamoro. As the peace process proceeds and the prospect of greater security increases, populations displaced from their land during the conflict may wish to return. Meanwhile, landowning elites will likely be encouraged to invest in their lands, which may further exacerbate land-related disputes/conflicts.[8] The draft Bangsamoro Basic Law (BBL) addresses the land issues in different sections.[38] A serious challenge is particularly on how to reconcile necessity of formalization of individual property, needs of economic development and respect of communal concept of property ownership in the region. As the draft BBL states, given the lengthy bureaucratic processes and limited coordination among different agencies related to land ownership, the Bangsamoro Government needs an office/institution that can respond to complex local contexts while facilitating land registration as well as agrarian reforms in more efficient and coordinated manner. In addition, when restoration is not possible, adequate compensation (including monetary reparation or provision of alternative land) should be made, thereby redressing grievances of the Bangsamoro people due to unjust dispossession of their lands.

7.2.2 Diverse Bangsamoro population

According to the 2001 census, in Mindanao Muslim ethnic groups, or Moros comprise 28.2%, non-Muslim indigenous people (IP)/Lumads[39] 5%, whereas Christians and migrant settlers comprise 71.8% of the population. It is said that there are thirteen Moro ethnic groups[40], and eighteen IPs/Lumads

[37] Vargas M (2004) cited in Knack, P. D. (2013). Legal frameworks and land issues in Muslim Mindanao. Land and Post-conflict Peacebuilding, Jon Unruh & Rhodri Williams (eds.), Earthscan, 451-474.

[38] Article V, Section2, 3. Land Registration. The Bangsamoro Government, in accordance with the land registration system of the Central Government, shall administer land registration in the Bangsamoro territory through an office it shall create for this purpose. The Bangsamoro Government shall furnish copies of the titles, deeds and other instruments to the relevant Central Government agencies. The Bangsamoro Government can act on consultas. The Bangsamoro Government may institute processes to promote more efficient registration of lands within the Bangsamoro.
Section 3, 31. Land management, land distribution, and agricultural land use reclassification.The classification of public lands into alienable and disposable lands shall be initiated and recommended by the Bangsamoro Government to the President for the timely implementation of Bangsamoro development plans and targets;
Section 3, 32. Cadastral land survey. The Bangsamoro Government shall have the authority to conduct cadastral surveys, lot surveys, and isolated and special surveys in the Bangsamoro. The Bangsamoro Government shall furnish the results of these surveys to, and coordinate with, relevant Central Government agencies to effect inclusion into national cadastral survey;
Section 4, d. To recognize constructive or traditional possession of lands and resources by indigenous cultural communities subject to judicial affirmation, the petition for which shall be instituted within a period of ten years from the effectivity of this Basic Law. The procedure for judicial affirmation of imperfect titles under
Existing laws shall, as far as practicable, apply to the judicial affirmation of titles to ancestral lands;
Section 4, e. To adopt and implement a comprehensive urban land reform and land use program, to ensure the just utilization of lands within its jurisdiction;
Article IX, Section 3. Vested Property Rights. Vested property rights shall be recognized and respected. With respect to legitimate grievances of the Bangsamoro people arising from any unjust dispossession of their territorial and proprietary rights, customary land tenure or their marginalization shall be acknowledged. Whenever restoration is no longer possible, the Central Government and Bangsamoro Government shall take effective measures for adequate reparation of the loss in such quality, quantity and status collectively beneficial to the Bangsamoro people, and to be determined mutually by both Governments.

[39] LUMAD is a Bisayan term meaning "native" or "indigenous": National Commission for Culture and Arts (NCCP): http://ncca.gov.ph/

[40] 1. Badjao, 2. Iranun, 3. Jama Mapun, 4. Kalagan, 5. Kalibugan, 6. Maranao, 7. Maguindanao, 8. Molbog, 9. Palawani, 10. Samal, 11. Sangil, 12. Taussug, 13. Yakan

residing in Mindanao.[41]

While Moros are a majority in the future Bangsamoro territories, the area is composed of a population with diverse cultural, ethnical, and religious identity. These are depicted in Figure 7.1.[42] Although diversity itself may not necessarily be the driver of violent conflict,[43] identity-based groupings are often mobilized into violence given the morphing nature of conflict in the Bangsamoro, as described previously.

Meanwhile, there is a significant presence of indigenous population in the Region. Although no accurate data are available, it is estimated that approximately 60% among more than 12 million IP nation-wide are in Mindanao. In the ARMM area alone, it is estimated that more than 200,000 IPs are scattered in different areas with its largest population in Maguindanao.[44] The National Commission on Indigenous People (NCIP) was established in 1997 to enact the Indigenous Peoples Rights Act (IPRA), and its mission is to "formulate and implement policies, plans and programs for the recognition, promotion and protection of the rights and well-being of IPs with due regard to their ancestral domains and lands, self-governance and empowerment, social justice and human rights, and cultural integrity".[45] In particular, one of the most important functions of NCIP is to ensure land tenure security by issuing the Certificate of Ancestral Domain/Land Title (CADT/CALT; Subsection 7.2.2).[46]

The IPRA also defines the concept of indigenous political structures, which includes use of commonly accepted justice systems, conflict resolution mechanisms, peace-building processes, and customary laws.[47] While each political structure is unique from the rest, the majority of IPs in Mindanao recognize their leader as either Datu and or Sultan, which are similar to those of Moros.[48] The IPRA also establishes procedures and mechanisms for safeguarding indigenous rights to cultural integrity, which covers the right to establish and control educational systems, recognition of cultural diversity, the right to protection of indigenous knowledge systems and practices, the right to science and technology, etc.

In terms of socio-economic development of IPs, the principle of free and informed consent underlines the IPRA,[47] and thus IPs are given the right to "determine for themselves policies, development programs, projects, and plans to meet their identified priority needs and concerns," and "shall have the right to accept or reject a certain development intervention in their particular communities". However, in reality, socio-economic conditions among IP population put them at a serious disadvantage when they try to exercise these rights. For example, it is generally recognized that IPs suffers from the limited access to basic services as well as external supports during conflict situations. They tend to reside in the remote areas, which further disadvantage for them in terms of geological accessibility. Implication of such poor service provision and delivery among IPs are illustrated in poor roads, uncomfortable housing condition, lack of transportation vehicles and high cost of fares, shortage of medicines, lack of or inaccessibility to doctors/hospitals, lack of clean water, lack of food supply, high incidence of diseases, and so forth (it is also suggested that education is one of the priorities among the IPs as it is perceived as a passport out of farming or rural poverty).[48]

[41] The term 'Lumad' is adopted by a group of 15 from a more than 18 Mindanao ethnic groups in their Cotabato Congress in June 1986 to distinguish them from the others: 1. Subanen, 2. B'laan, 3. Mandaya, 4. Higaonon, 5. Banwaon, 6. Talaandig, 7. Ubo, 8. Manobo, 9. T'boli, 10. Tiruray, 11. Bagobo, 12. Tagakaolo, 13. Dibabawon, 14. Manguangan, 15. Mansaka. (NCCP)
[42] National Statistics Office (NSO), 2000 Census of Population and Housing
[43] For example, a widely known research by Collier et al [Collier, P., & Hoeffler, A. (2004). Greed and grievance in civil war. Oxford economic papers, 56(4), 563-595] suggests that greater ethnic and religious diversity reduce the risk of conflict
[44] The Office for Southern Cultural Communities (OSCC)-ARMM:http://osccarmmgov.ph/
[45] NCCP: http://www.ncip.gov.ph/
[46] For ARMM area, the Office for Southern Cultural Communities (OSCC)-ARMM was created in 1991, to protect and promote the rights of IPs, however, it does not have powers to issue the CADT nor CADC (certificate of ancestral domain claim).
[47] Plant, R. (2002). Indigenous peoples/ethnic minorities and poverty reduction: Regional report.
[48] Buendia, R., Mendoza, L., Guiam, R., & Sambeli, L. (2006). Mapping and Analysis of Indigenous Governance Practices in the Philippines and Proposal for Establishing an Indicative Framework for Indigenous People's Governance: Towards a Broader and Inclusive Process of Governance in the Philippines.

Figure 7.1 Demographic Composition

The draft Bangsamoro Basic Law (BBL) adopts a broader definition of the Bangsamoro identity[49], which would ensure the inclusiveness of highly diverse population within the Bangsamoro territory. In particular, it appears to put greater emphasis on protecting the right of IPs as shown in several sections of the draft BBL such as Article V-Section 3-30, Article IX-Section 5, Section 34, etc. It envisions creation of an appropriate office or ministry, and IP's equitable share from the revenues generated from the exploration, development and utilization of natural resources that are found within the territories covered by a native title in their favor. It also envisions establishment of a Tribal University, which provides both traditional and the Western education curriculum to ensure cultural integrity and access to modern education. Recent re-affirmation of kinship of Tabunaway and Mamalu (reportedly,

[49] Section 1. Bangsamoro People.–Those who at the time of conquest and colonization were considered natives or original inhabitants of Mindanao and the Sulu archipelago and its adjacent islands including Palawan, and their descendants, whether of mixed or of full blood, shall have the right to identify themselves as Bangsamoro by ascription or self-ascription. Spouses and their descendants are classified as Bangsamoro.

Teduray tribe coming from Apo Mamalo and Maguindanaon from Apo Tabunaway have an ancestral kinship) may be another attempt to strengthen harmony among IPs and Moro communities under the Bangsamoro.

Meanwhile, to address needs of the diverse Bangsamoro people, an approach of culture-sensitive governance is found in Sultan Kudarat[50], Barira[51] and Upi[52], that combine formal with the traditional ways of governance. For example, a so-called tri-people approach in Upi is designed in such a way that the traditional methods of conflict resolution and formal process are mutually supplemental. If the conflicting parties are both Tedurays, the case is resolved before the kefeduwan (person who is well-versed in Teduray customs and traditional laws), and if both Muslims, before the kokoman (Shariah Law base). If the case is cross tribal, the Mayor's Council sits *en banc*. Unresolved cases are forwarded to the police authorities for proper filing. The program incorporates the old customs of sealing a resolution or an agreement, such as cutting of rattan and scrapping of fingernails among Tedurays. The Katarungang Pambarangay was strengthened since the Mayor's Council would not hear or settle cases unless they passed through the barangay court. Similarly development projects are planned to contribute equally to the tri-people. Such culture sensitive approach may have a significant implication for the inclusive development in Bangsamoro.

7.2.3 Intra-regional development gaps

It is widely recognized that Bangsamoro severely lags behind other regions of the Philippines in terms of socio-economic development as often articulated in development plans and strategies related to the Bangsamoro areas. Compounded with such inter-regional disparity, however, the future Bangsamoro needs to address intra-regional disparities. In particular, while island provinces such as Basilan, Sulu and Tawi-Tawi may consist more than one-third of the Bangsamoro population, the socio-economic situation of people in those provinces lag behind those in the mainland area, creating serious concerns with security as well.

The Human Development Report[53] clearly illustrates inherent inter and intra development gaps of the future Bangsamoro. As Table 7.1 shows, life expectancy in Basilan, Maguindanao, Sulu and Tawi-Tawi consist a bottom cohort in life expectancy, whilst Sulu and Tawi-Tawi severely lag behind. Overall, the human development index (HDI) of most of the proposed core territory of the Bangsamoro remains at the bottom within the Philippines, even while there are significant disparities among the provinces within the territory (Table 7.2). Poverty and inequality also are also severe in the island provinces as seen in Table 7.3, although Table 7.4 indicates a more complex poverty distribution situation in Bangsamoro.[54]

In terms of security, while number of conflict incidents is higher in the mainland provinces, particularly in Maguindanao, conflict intensity in the islands is severe when viewed in terms of density and conflict per person.[4] The BDP I report also points out that the majority of informal settler families (ISF) (among more than 20,000 families in the Bangsamoro), are in island provinces, particularly in Sulu, and 10% of the ISFs are living in danger areas of those provinces that will need resettlement.

Although population in the island provinces are generally supportive to the Bangsamoro process, they may feel marginalized if sufficient attention is not paid to their particular needs and aspirations. While many suggests great development potential in the island provinces given the abundant water resources and proximity to Malaysia if properly utilized, the reality of prevailing criminal acts such as kidnapping and terrorist activities in island provinces may be one clear indication of how vulnerable livelihoods are in those areas. Thus, any development efforts should pay careful attentions to such intra-regional

[50] The house of court is organized at the municipal and barangay levels to settle conflicts that involve theft, homicide, murder, marriage, maratabat, land dispute, etc.
[51] The joint ulama municipal peace and order council is composed of representatives from the ulama, traditional leaders, local government officials, etc. at the barangay and municipal levels to address conflicts including land conflicts, and political feuds
[52] The mayor's council consist of the Teduray, Muslims, and Christian representatives to mediate conflicts.
[53] 2012/2013 Philippine Human Development Report: http://hdn.org.ph/20122013-philippine-human-development-report/
[54] Incidence of poverty refers to the share of the population whose income or consumption is below the poverty line. Depth of poverty refers to how far off households are from the poverty line. Whereas, poverty severity refers to the distance separating the poor from the poverty line, and the inequality among the poor.

disparities, and development potentials particularly in the less developed areas (such as fisheries and cross boarder trades in island provinces) need to be further explored, thereby avoiding creating marginalized areas/communities within the Bangsamoro.

Table 7.1 Provinces with Short Life Expectancy

Bottom provinces	Life expectancy at birth (years) 2009
Ifugao	59.8
Surigao del Sur	59.7
Western Samar	59.6
Mt. Province	59.4
Kalinga	59.2
Basilan	58.9
Lanao del Sur	53.8
Maguindanao	52.4
Sulu	49.0
Tawi-Tawi	46.8

Table 7.2 Provinces with Low HDI

HID rank	Province	HDI
70	Lanao del Sur	0.416
71	Masbate	0.406
72	Zamboanga del Norte	0.384
73	Sarangani	0.371
74	Davao Oriental	0.356
75	Agusan del Sur	0.354
76	Zamboanga Sibugay	0.353
77	Tawi-Tawi	0.310
78	Maguindanao	0.300
79	Sulu	0.266

Table 7.3 Gini Index

Province	Gini Index (2009)
Basilan	0.358
Lanao del Sur	0.392
Maguindanao	0.318
North Cotabato	0.392
South Cotabato	0.508
Sulu	0.200
Tawi Tawi	0.286
Philippines	0.463

Table 7.4 Poverty

Province	Poverty incidence	Depth of Poverty	Severity of Poverty
Basilan	27.5	3.7	0.8
Lanao del Sur	45.2	10	3.1
Maguindanao	50.0	12.6	4.4
North Cotabato	33.1	9.9	4
South Cotabato	29.6	9.1	3.8
Sulu	45.6	7.8	1.9
Tawi Tawi	38.4	9.4	2.9
Philippines	26.3	7.2	2.8

7.2.4 Shadow economy

The informal economy or shadow economy is an important feature of Mindanao's political economy, but tends to be overlooked.[55] The term, shadow economy, used here does not necessarily emphasize negative/illicit aspects of the real economy of Mindanao, but also attempts to highlight "shadowy margins"[55] between formal and informal economy (Figure 7.2), rather than juxtaposing the two as separate entities. For instance, informal land markets where land are transferred, mortgaged, traded or sold outside of the government's land regulations, thrive in Mindanao because of the shortcomings, and complexity and costliness of the formal land market as examined in sub-section 7.2.2.[20] For those who need to monetize their land, informal land markets are their choice, primarily because it is easier to enter these than in formal markets. They are mediated and guaranteed by local strongmen such as clan leaders and political elites, which confers legitimacy on informal transactions.[20] In general, it is argued that informal land markets generate less conflict compared to cases where formal arrangements impinge upon informal transaction.[20] However, the very nature of these preferred transactions, i.e. a) insecurity of property rights, b) multiplicity of transfers and verbal agreements, c) not sensitized to correct

[55] Lara, F. J., & Schoofs, S. (Eds.). (2013). Out of the shadows: violent conflict and the real economy of Mindanao.

appraisal of market prices, ensures that they will always remain vulnerable to conflicts and violence in times of difficulty or disagreement.[55]

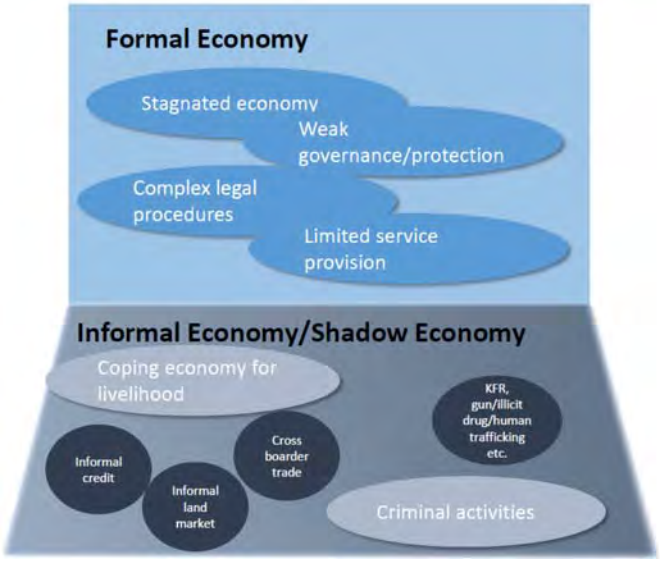


Figure 7.2 Shadowy Margin between Two Economies

Similarly, informal credit systems also thrives because of poor functioning or the absence of formal credit market/institutions.[56] Fragile security, and the limited availability of suitable collateral among prospective borrowers, compounded by ill-defined property rights and a weak legal infrastructure in many areas in Mindanao, further exacerbate reluctance among credit institutions to extend lending service.[56] In contrast, traditional credit practices transfer small loans quickly without too many formalities, and are much more flexible than banks in accepting alternative arrangement instead of suitable collateral.[56] *Pagsanda* in Sulu can finance traditionally important socio-cultural affairs such as wedding, death and burial rituals, and others such as hospital expenses, tuition fees, personal security, non-productive activities to which the banks are less likely to disburse loans.[56] Such informal money transactions, usually facilitated through personal relationships with moneylenders (often those occupying the highest ranks in local government or other social strata) without written documents, can readily evolve into a clan feud with disastrous consequences.[56]

Meanwhile, long-established informal cross-border trade including smuggling of large amount rice, fuel oil and gasoline and other consumer products, involves (and benefits) different actors and state authorities.[57] It is suggested that such economic transactions may not cause or have direct links with conflict and violence, but rather serves as a coping economy ensuring the livelihood of ordinary people during difficult times. However, the illicit trade of dangerous items such as guns and narcotics as well as human trafficking operating in parallel with such informal trades, have serious implication for instability in the Region.[57]

The highly porous gun market in the Country is sustained by a parasitic relationship between the legal and illegal economy where state officials are often involved in subverting state regulation or where regulation itself creates incentives for the illicit trade.[58] While law enforcement on illicit drugs remains weak in the Region, drug money becomes one currency used in attaining political power, the proliferation of unlicensed firearms, and the presence of large number of armed groups including private armies and paramilitary. Together these can become a deadly cocktail that can further fuel violence in the political landscape in Bangsamoro.[59] It is also a concern that young people who are deprived of educational and job opportunities[60], and ex-combatants with marketable skills can be attracted into criminal shadow economies, if alternative opportunities for sustainable livelihoods are not given to

[56] Kamlian, J. (2013). Borrowing money and violence: the Pagsanda credit system in Sulu. In Out of the Shadows: Violent Conflict and the Real Economy of Mindanao (pp. 145-196). International Alert London.
[57] Villanueva, S. (2013) Cross-border illicit trade in Sulu and Tawi-Tawi: The coexistence of economic agendas and violent conflict. In Out of the Shadows: Violent Conflict and the Real Economy of Mindanao (pp. 145-196). International Alert London.
[58] Quitoriano, E. (2013). Shadow economy or shadow state? The illicit gun trade in conflict-affected Mindanao. In Out of the Shadows: Violent Conflict and the Real Economy of Mindanao (pp. 145-196). International Alert London
[59] Cagoco, R. & Schoofs, S. (2013). A deadly cocktail? Illicit drugs, politics and violent conflict in Lanao del Sur and Maguindanao. In Out of the Shadows: Violent Conflict and the Real Economy of Mindanao (pp. 145-196). International Alert London.
[60] In fact, study by the Institute of Bangsamoro Studies and the Centre for Humanitarian Dialogue (2011). Armed Violence in Mindanao: Militia and Private Armies. Geneva: Centre for Humanitarian Dialogue points out that poverty and lack of employment options are common reasons cited by members for joining militia, particularly among youth with limited education.

them.[61]

Shadow economies can be a source of conflict precisely because they embody a significant amount of economic and political capital that sustain local strongmen, political elite and powerful clans.[62] The existence of an underground economy in Mindanao manifested the continued control of local enclaves by powerful clans and Datus who brokered relationships with the state as well as with other economic actors.[16] In particular criminal shadow economies such as illicit weapons and drug trades are closely linked to inter- and intra-clan wars or electoral battles between warlord-politicians, and proliferation of guns and enormous profits generated from illicit drugs can make conflict more deadly.

Meanwhile, shadow economies provide critical employment and livelihood opportunities to marginalized and vulnerable people in poor communities even during severely difficult periods.[55] Informal land markets facilitate the use of productive or idle land that generated additional employment and livelihoods, and long established informal cross-border trade has been a valuable source of livelihood of large population.[55] [20] Any effort to apply a uniform or nondiscriminatory approach to shadow economies may actually penalize marginalized population, including youth and women, more than their criminal counterparts.[63] Thus, some suggests a necessity to disaggregate shadow economies,[55] and through selective formalization of informal economy, for example, some parts of cross boarder trades, livelihoods and employment of ordinary people can be sustained while a valuable tax source can be secured for the local and regional government.

7.2.5 Gender gaps

The Gender Development Index (GDI)[53] indicates the female population in the Bangsamoro persistently faces disadvantages, as shown in Table 7.5. Maguindanao, Basilan, and Sulu remain the bottom provinces (while Tawi-Tawi is excluded as it does not have gender-segregated data). As Table 7.6 indicates, the income gap between male and female is particularly wide. This seem natural given the very low labor participation rate among women. According to ILO, labor force participation is only 56%, and the male-female gap is the highest (46.5 percentage points) in the ARMM[64]. The WB/WFP report[65] also points out serious vulnerability of women in Mindanao. For example, women headed households are more vulnerable compared to those headed by men. For example, they were more likely to have a poor food consumption score (FCS) and to be in the poorest wealth quintile. They are more likely to be illiterate and less likely to have access to land compared to their male counterparts.

Table 7.5 Provinces with Low GDI, 2009

Rank	Province	GDI
58	Ifugao	0.441
59	Mt. Province	0.430
60	Masbate	0.424
61	Rombion	0.422
62	Sarangani	0.408
65	Davao Oriental	0.356
66	Maguindanao	0.348
67	Sulu	0.337
68	Agusan de Sur	0.332
69	Basilan	0.313

Gender-based violence (GBV), and human trafficking are also serious concerns for Bangsamoro women although these incidences often go underreported. The HAP 2013 Multi-Cluster Needs Assessments[66] suggest that lack of reliable and confidential services is one of the main reasons why the majority of GBV cases go unreported and are often instead settled through local mediation. Further political and economic empowerment need to be ensured through gender mainstreaming, and job creation for women would greatly contribute to peaceful and productive Bangsamoro. While existing many CSOs can play a greater role to further advocate women issues, some argue that women's groups in the region have fragmented along religious, ethnic and political lines, which may hamper bargaining power among

[61] Policy brief, April 2014, International Alert, Mindanao's Shadow Economies
[62] Policy brief, April 2014, Mindanao's Shadow Economies, International Alert
[63] Policy Brief, April 2014, International Alert, Porous peace in Mindanao's Free Trade Area
[64] ILO Country Office for the Philippines: Philippine Employment Trends 2015: Accelerating inclusive growth through decent job
[65] Violent conflicts and displacement in Central Mindanao: Challenges for recovery and development, World Food Programme, World Bank, 2011
[66] http://docs.unocha.org/sites/dms/CAP/2013_Philippines_HAP.pdf

women.

Thus, appropriate consultation mechanisms for women need to be established, through which protection of rights of women should be further strengthened, and women's political, and socio-economic participation must be carefully ensured. The draft BBL stipulates that the Bangsamoro Government shall allocate at least 5% of the total budget appropriation of each ministry, office, and constituent local government unit for gender responsive programs, in accordance with a gender and development (GAD) plan (5–30% of the official development funds shall be set aside to complement the GAD budget allocation). Besides such arrangements, gender sensitive perspectives should be embedded in any development programming to ensure that women benefit equally.

Table 7.6 Gender-related Indices

Province	GDI 2009		Life expectancy at birth (years) 2009		Mean years of schooling 2008		Expected years of schooling 2008		Estimated earned income (PPP NCR 2009 pesos 2009)	
	Rank	Value	Male	Female	Male	Female	Male	Female	Male	Female
Basilan	69	0.313	63.5	63.4	7.6	7.0	12.6	12.0	53,438	13,907
Lanao del Norte	27	0.533	65.9	65.5	8.4	9.1	12.7	12.6	46,050	31,982
Lanao del Sur	56	0.443	55.9	63.2	7.0	6.8	12.5	12.9	29,075	32,381
Maguindanao	66	0.348	65.7	60.6	6.3	6.3	9.8	10.5	29,663	17,781
North Cotabato	50	0.468	67.5	68.2	7.2	7.6	11.0	11.8	47,106	24,054
South Cotabato	16	0.584	68.3	68.2	8.6	8.9	12.1	12.2	59,093	36,619
Sulu	67	0.337	58.8	57.8	4.7	4.5	10.9	11.6	23,890	21,431
Tawi Tawi	-	-	-	-	-	-	-	-	-	-

7.2.6 Youth issue

As Figure 7.3[67] illustrates, the Bangsamoro (core territory) will consist of a large cohort of youth: some 55.4% are between the ages of 5–19 years old. A youthful population itself can be a blessing for economic development as it can provide a valuable future workforce. Research indicates that large youth cohorts may represent a significant resource that can boost development, a so-called demographic dividend[68], but this can only be realized through properly addressing the social, economic, and political environment needed to make that happen.[69] However, the current low level of labor force participation is a serious obstacle to tap such potentials. Youth labor force participation is only 35.1% among 15-24 year olds.[64] Compounded with low participation in education and training among the Bangsamoro youth, while the literacy rate in 2000 ranged from 58.3% in Sulu, 66.3% in Maguindanao, to 86.7% in North Cotabato[67], a large cohort of young people may potentially become a curse in peace-building in the area.

Considering that a large proportion of children will reach adolescence very soon, and steady population growth in the area, the average annual population growth rate in the Bangsamoro Core Territory from 2000– 2010 being estimated at 2.41% compared to the national average of 1.9%, and the fastest growing provinces were Basilan, Tawi-Tawi, and Lanao del Sur, with estimated annual population growth rates of 3.78%, 3.51%, and 2.92%, respectively[67], the youth population will only expand further in coming years. This means that Bangsamoro presents a classic case of *youth bulges*[70], which argues that disproportionally large number of youth with limited education and job opportunities can create a frustrated group within the society, whose distress can be easily ignited into violence.

Concerted efforts of the government, education/training institutes as well as private sectors are required to create an enabling environments for youth development. Provision of education and training opportunities to youth through programs such as scholarship and skills development interventions

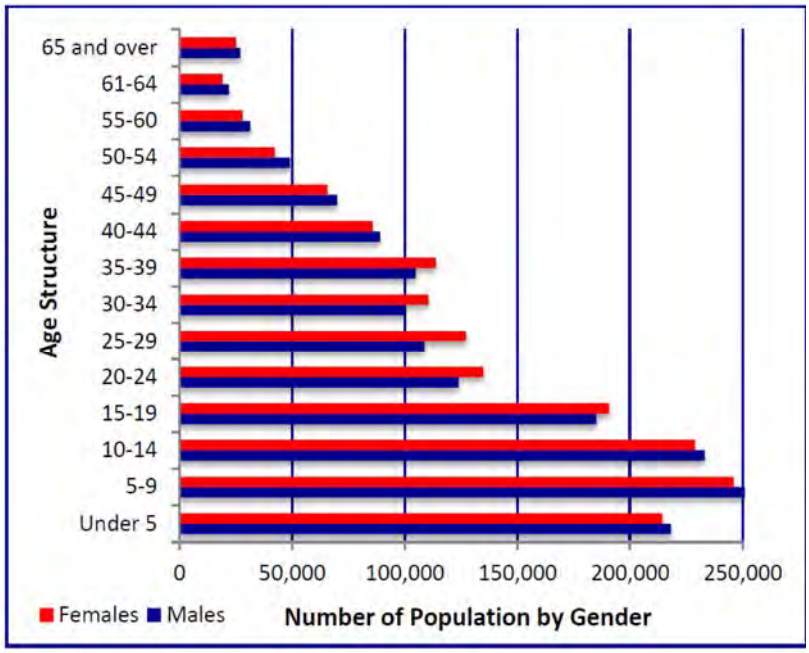
[67] PRIMEX: Environmental and Social Baseline Survey for Comprehensive Capacity Development Project for the Bangsamoro

[68] Barakat, B., & Urdal, H. (2009). Breaking the waves? Does education mediate the relationship between youth bulges and political violence?. *Does Education Mediate the Relationship between Youth Bulges and Political Violence*.

[69] Williamson, J. G. (2001). Demographic change, economic growth, and inequality. *Population Matters: Demographic Change, Economic Growth, and Poverty in the Developing World*, 106-136.

[70] Huntington, S. P. (1996). *The class of civilizations and the remaking of world order*. Penguin Books India.

should be expanded. The private sector can help enhance the quality of the programs and increase youth's employability through identification of the appropriate skills requirements that economies need. Establishment of school-industry partnership arrangements would enhance the relevance of education/training and facilitate youth's smooth transition from school to work. As job creation is a key for sustainable youth development, initiatives such as entrepreneurship assistance can also contribute to increase economic participation among youth in the Bangsamoro where the labor market remain very limited.



Source: Table and figure prepared by PRIMEX Survey Team based on PSA data.

Figure 7.3 Demography in Bangsamoro

7.2.7 Clan feuding (rido)

Collins (2004) suggests that a clan may be defined as "an informal organization comprising a network of individuals linked by kin-based bonds. Affective ties of kinship are its essence, constituting the identity and bonds of its organization. These bonds are both vertical and horizontal, linking elites and non-elites, and they reflect both actual blood ties and fictive kinship."[71] Over the past several years, there has been a steady rise in clan feuding (called *rido* in the local languages) conflicts in Mindanao, and most of the cases remain unresolved.[72]

A rido can involve different actors (within kinship groups, or between different kinship and ethnic groups). It can be triggered by different causes (theft, homicide, political rivalries, and land disputes), but many suggest that *maratabat* is at the core of many violent rido. Maratabat stands for honor, pride and self-dignity, and determines the behavioral and social patterns of a group,[73] and it is essentially related to the long-term identity of the clans. Some suggest that maratabat should not be viewed as separate from different causes that are said to trigger a rido, because defending his honor/pride by retaliating to a perceived prejudice, insult, etc., is essentially interwoven with such seemingly explicit causes of violence such as land disputes, political rivalries, business competition etc.[74] Some even further suggest that the more educated and economically better off are the ones most indulging in rido.

[71] Collins, K. (2004). The logic of clan politics: evidence from the Central Asian trajectories. World Politics, 56(02), 224-261.
[72] Torres, W. M. (2007). Rido: Clan feuding and conflict management in Mindanao. Asia Foundation.
[73] Bacaron, M. A. (2010). Indigenous Conflict Resolution Mechanism in Mindanao: Is their Institutionalisation the Answer? Notes from the Editor's Desk, 3(1).
[74] Doro, M. E. (2007). Management and Resolution of Rido among Meranao in Baloi, Lanao del Norte: Case Studies. *Rido: Clan Feuding and Conflict Management in Mindanao*, 202-253.

That is because as wealth and education increases, the perpetrators sense of his own maratabat, being related to "status and rank sensitivity" also increases.[75]

There currently exists formalized government and indigenous frameworks of resolving a rido; the former refers to the government laws, and involves the formal courts, the local chief executives, the Katarungang Pambarangay, the police, and the Armed Forces of the Philippines (AFP) in some cases.[72] In contrast, the latter refers to customary law and Shari'ah (Islamic law), and involves elders and community leaders who utilize local knowledge, beliefs, practices, and their network of personal ties to help restore damaged relationships.[72] Many point out that a formal approach is seldom used to settle a rido because legal proceedings are perceived to be tedious and costly,[76] whereas informal mechanisms are perceived to be cheaper and easier to use.[77] Others also suggest that maratabat, and persistence on avenging grievances often discourages submission to formal/judicial processes.[74]

As maratabat is in essence an identity issue, prevailing practices of giving restoration/settlement money (or *blood money*) need to be understood not only in terms of material exchange, but also for its symbolic and spiritual elements that facilitate forgiveness and healing.[72] However, such indigenous practice also has their limitations; it requires actual blood money as well as credible mediators who know the procedures and are accepted by conflicting parties. Thus, failure to raise sufficient blood money (public funds of the Local Government Unit is said to be used as blood money to help resolve a rido[78]) or weakening legitimacy of traditional mediators, make effective conflict resolution impossible.[73] In addition, a rido that is related to criminal activities such as drug trade, cannot be mediated by the traditional framework because the conflicting parties need to hide the criminal facts of their conflict.[79]

Moreover, it is argued that customary law may address the offense caused, but it does not deal with the root causes of the conflict such as lack of economic opportunities, land disputes, weak governance, and so on.[73] In any case, the proliferation of guns, lack of law enforcement and credible mediators, an inefficient justice system, and prevailing shadow economy, all contribute to make a rido even more deadly and obstacles to peaceful resolution all but insurmountable.

7.2.8 Displacement

According to the Displacement Dashboard[80], the total number of internally displaced persons (IDPs) by conflict in Mindanao reached 123,779 in December 2014, of which majority were a result of armed conflict with government forces and by clan feuds. In the ARMM area alone, a total of 64,648 people were displaced in the mainland, whereas a total of 28,526 were displaced in the islands in 2014. As the report of the Protection Cluster Mindanao points out, most of the recent conflict related displacements were caused by the armed clashes between the Armed Forces of Philippines (AFP) and the Bangsamoro Islamic Freedom Fighters (BIFF), and sporadic clashes between the Abu Sayaf Group (ASG) and the AFP displaced over 16,000 people in Basilan and Sulu. Such a gloomy record indicates that so-called vertical conflict between the state and non-state actors remain a serious obstacle for the peace in Bangsamoro. Although the number of internal displaced persons (IDPs) caused by clan feuding is less than that of the vertical conflict, it also remains one of the major drivers for the IDPs.

Options for the IDPs may be (a) social and economic integration of IDPs into existing localities; (b) return and reintegration into places of origin; and/or (c) resettlement into other (new) areas. When

[75] Matuan, M. I. (2007). Inventory of Existing Rido in Lanao del Sur (1994-2004). Rido: Clan feuding and conflict management in Mindanao, 70-96.
[76] For example, the Local Government Code provides for the creation of Katarungang Pambarangay (Barangay Justice) as a conflict mediation body in every barangay. However, disputes that involve penalties of imprisonment exceeding one year or a fine exceeding PHP 5,000 are beyond its jurisdiction, and has no authority over disputes involving parties residing in other cities or municipalities or properties in other cities and municipalities [Lingga 2005].
[77] LINGGA, A. (2005). Dynamics and Management of Rido in the Province of Maguindanao. *Institute of Bangsamoro Studies*
[78] Management of Clan Conflict and Rido Among the Tausug, Magindanao, Maranao, Sama, and Yakan Tribes Ofelia L. Durante, Norma T. Gomez, Ester O. Sevilla, and Howard J. Mañego Ateneo de Zamboanga University Research Center and Notre Dame University Research Center.
[79] Matuan, M. I. (2007). Inventory of Existing Rido in Lanao del Sur (1994-2004). *Rido: Clan feuding and conflict management in Mindanao*, 70-96.
[80] Protection Cluster Mindanao, Philippines (http://www.protectioncluster.org/philippines/)

poorly governed, displacement becomes a breeding ground for instability.[81] Although many IDPs may wish to return to their original locations, concerns on their own safety as well as destruction/loss of their homes and means of livelihoods are serious obstacles in reality.

Meanwhile, roughly four out of 10 IDPs are house-based with most of them living with relatives, and they are less visible than people in evacuation centers or in relocation sites, leading to the impression that they have less urgent needs.[82] For them, what started as a temporary hosting solution has often become permanent, as people find livelihoods and social networks. However, IDPs also have to compete with the host population to access scarce job opportunities, sometimes causing tensions between the displaced and their hosts.[82]

Many suggested that IDP issues are not only an emergency humanitarian issue but also a development issue in the Bangsamoro as the backdrops of displacement are largely related to the weak governance such as land-related issues, shadow economy, ineffective justice mechanism etc. and stalled socio-economic situations. However, most relief efforts have gone into providing emergency humanitarian assistance, but not enough towards ensuring sustainable solutions both in terms of security and livelihood opportunities. Thus, a better coordination mechanism between actors in emergency/relief assistance and those in development should be established. For example, as the large majority of the IDPs are said to be women, supports to the IDPs can be linked with the aforementioned GAD plan and programs, thereby mitigating emergency-development gaps.

7.2.9 Other relevant issues

Vulnerability of food security within the area may be one major obstacle to the resilient Bangsamoro society as it may imply the population cannot even satisfy their minimum basic needs. It is estimated that a food consumption score (FCS) is categorized as *poor* and *borderline* among 12% and 44% of households in Maguindanao, and 18% and 32% respectively in Lanao del Sur.[83]

Disability is another issue, which has not received due attention thus far. While the rights of the persons with disability (PWD) are protected by the existing laws such as RA7277[84] and RA 9442[85], it is suggested that realization of such laws is far more important given the lack of attention and financial supports on the issues. The draft BBL addresses the right of PWD (for example, Article IX: Basic rights[86]), but PWD may be one of the groups who have been limited attention within current development discourse in the Bangsamoro.

While data about PWD remain limited, this group requires more attention in development in order to address their specific needs. The Center for the Handicapped (under the Region IXX of the Department of Social Welfare and Development: DSWD) currently serves not only clients in the region, but also many clienteles from the ARMM. The Center provides trainings such as consumer electronics (cellular phone repair), basic computer operation and troubleshooting, massage therapy to different types of PWD, and seeks to find placement jobs for them. Decommissioning of the BIAF combatants may further increase the necessity of strategic approach towards PWD, and specialized services may need to be expanded.

Meanwhile, the widespread historical use of and reliance on militia also poses serious threat for the stability of the Region.[87] Paramilitary forces such as Civilian Armed Force Geographical Units (CAFGU) and Special CAFGU Active Auxiliary (SCAA) comprise significant part of the AFP, mostly

[81] The Search for Durable Solutions: Armed Conflict and Forced Displacement in Mindanao, Philippines, Nat J. Coletta
[82] Cycle of conflict and neglect: Mindanao's displacement and protection crisis, Internal Displacement Monitoring Centre, Norwegian Refugee Council
[83] Philippines (Mindanao) Humanitarian Action Plan 2013
[84] http://www.ncda.gov.ph/disability-laws/republic-acts/republic-act-7277/
[85] http://www.ncda.gov.ph/disability-laws/republic-acts/republic-act-9442/
[86] i. Right to equal opportunity and nondiscrimination in social and economic activity and the public service, regardless of class, creed, disability, gender and ethnicity, Section16. Support for Persons with Disabilities. The Bangsamoro Government shall establish a special agency and support facilities for persons with disabilities and other disadvantaged persons for their rehabilitation, and livelihood or skills training to encourage their productive integration into mainstream society.
[87] Institute of Bangsamoro Studies and the Centre for Humanitarian Dialogue. (2011). Armed Violence in Mindanao: Militia and Private Armies. Geneva: Centre for Humanitarian Dialogue.

based in Mindanao to combat insurgents. These civilian volunteer organizations (CVOs) were originally created to assist the CAFGUs, and function as auxiliaries to the Philippine National Police (PNP) through legally mandated Peace and Order Councils in rural and municipal areas; however most of the barangays do not have active Barangay Peace and Order Councils.[87]

In addition, the presence of vigilante groups such as brutal Ilonggo Land Grabbers Association (ILAGA), and large number of private armies linked to clans and politicians pose serious threats for sustainable peace in the region. In particular, small scale confrontations between families and groups could escalate and expand into large-scale war through drawing armed groups such as the CVO, CAFGU, SCAA or local rebel-based commands and their militias as those warring families/groups could often be associated with such armed groups.[88] The lack of attention on such armed groups may have profound consequences for peacemaking policy and practice in the future Bangsamoro.

7.3 Development and Peace-building in Bangsamoro

Plodinec (2009) defines resilience as "the capability to anticipate risk, limit impact, and bounce back rapidly through survival, adaptability, evolution, and growth in the face of turbulent change".[89] Socio-economic fabric of the Bangsamoro society has been severely devastated by more than two centuries of turbulent (and often violent) historical-social processes in Mindanao. Yet, it also shows us the resilience and creativity of survival strategies of Bangsamoro people.

With the absence of (or weak) formal justice system, traditional systems such as customary laws and Sharia give the population more accessible, faster, less costly and less bureaucratic conflict resolution.[8] Such traditional justice systems confer more legitimacy than formal ones not just because of their functionality, but because they are deeply embedded in identities of Moros and indigenous population in Mindanao. In fact, it is suggested that prevailing land-related issues should not be approached solely on the basis of economic rights to private property in the Western liberal sense, but as a determinant of the survival of communities and their culture, the basis of their identity as a people.[10]

In a similar vein, ancestral domain is not just a piece of a territory as it supports not only the biological and economic needs of IPs and Moros, but is also the basis of their cultural identity.[90] In such a context, it is argued that the imposition of a conventional, top-down agrarian reform program in Mindanao where specific cultural institutions of communal and clan ownership over land prevail is partly to blame for the violence.[7]

Meanwhile, as mentioned previously, shadow economies provide critical employment and livelihood opportunities to marginalized and vulnerable people in poor communities even during severely difficult periods.[55] Thus, any effort to apply a uniform or nondiscriminatory approach to shadow economies may actually penalize marginalized population, including youth and women, more than their criminal counterparts.[63]

Decades of conflict has also led to substantial changes in women's lives, sometimes in an unexpectedly positive manner, as women have been forced to take on new roles that were traditionally restricted only to males.[91] For example, displaced women often play a major role in construction of their own shelters, and are sometimes engaged in small entrepreneurship such as sari-sari store. In addition, women's potential role as pacifiers may be valuable source for peace-building in the Bangsamoro society.[92]

However, dependence on traditional mechanism and people's informal survival strategies can drive Bangsamoro development into a historical pitfall; the modern history of Bangsamoro shows that the colonizers and the national state tried to extend their authority to the region through brokering alliances

[88] Big War, Small Wars: The Interplay of Large-scale and Community Armed Confl icts in Five Central Mindanao Communities Jose Jowel Canuday
[89] Plodinec, J. (2009). Definitions of resilience: An analysis. *Oak Ridge: Community and Regional Resilience Institute (CARRI)*.
[90] Erasga, D. S. (2010). Ancestral domain claim: The case of the indigenous people in Muslim Mindanao (ARMM). Asia-Pacific Social Science Review, 8(1).
[91] Dwyer, L., & Cagoco-Guiam, R. (2010). *Gender and Conflict in Mindanao* (p. 7). The Asia Foundation.
[92] Management and Resolution of Rido Among Meranao in Baloi, Lanao del Norte: Case Studies Monalinda Emperio Doro

with local strongmen.[55] In their pursuit of pacification, the Americans had to work with the Datus as brokers, and succeeded in enrolling these local leaders in their drive to exploit the region's vast resources.[16] Although the power of Datus was severely affected by an influx of settlers and expansion of agribusiness, strong man rule continued to shape the transformation of Mindanao.[16] It is argued that even rebels recognized the abuses of Datu leadership, but that there were practical considerations that prevented them from confronting them, particularly their respective movements' dependence on the support of local political leaders.[93] As mentioned previously, shadow economies can be a source of conflict precisely because they embody a significant amount of economic and political capital that sustain local strongmen, political elite and powerful clans.[94]

Although the Moro and IP communities tend to favor traditional conflict resolution mechanisms rather than formal justice system,[8] it is also argued that such traditional system are not always quicker, cheaper or more accessible, nor inclusive or even effective in resolving local disputes.[95] While institutionalizing traditional/informal practices may facilitate easier access to justice and socio-economic needs of the region, this could destabilize democratic processes because it confers power on local strongmen and reinforces their long-standing hegemony.[95]

While dismantling the clan structure or local strongmen rule is almost impossible as it provides adequate social protection and legitimacy to the community,[72] the challenge in Bangsamoro is how development can harness its resilience of traditions and creative socio-economic survival strategies while alleviating the potentials of violence and addressing democratic aspirations and economic interests of ordinary Bangsamoro people. The future Bangsamoro government clearly requires good governance, better law enforcement, and strengthening of the rule of law, but Bangsamoro will also call for recognizing the need for co-existence of different but deeply interconnected formal and traditional practices for the sustainable peace and development.

In a war-torn society such as Bangsamoro, quick delivery of peace dividends such as social services and economic benefit to a war ravaged population may greatly contribute to building a new Bangsamoro government, in that it increases government visibility and legitimacy among hitherto marginalized communities. However, it is equally important to identify the most culturally sensitive approach to deliver such services that can address Bangsamoro people' diverse needs and aspirations, thereby ensuring the principles of "do no harm" and "do maximum good".[96] While it can be considered as a classic dilemma of post-conflict recovery between quick service delivery and sustainable peace-building, there is no single ideal solution. Bangsamoro is no different. The Bangsamoro Development Plan must be a catalyst that exerts influence to stakeholders to maintain a balance between the two goals and hopefully contribute to transform culture of war into sustainable culture of peace.

[93] Gatmaytan, A. B. Class Tensions and the MILF in a Post-Conflict Maguindanao.
[94] Policy brief, April 2014, Mindano's Shadow Economies, International Alert
[95] Fischeder, S. (2006). 'Ridos' in the Hinterland Barangays of Iligan City. Cited in Bacaron, M. A. (2010). *Indigenous conflict resolution mechanisms in Mindanao: Is their institutionalisation the answer? Notes from the editor's desk*, 3(1).
[96] The principle of "do no harm" asks for attention on the potential harm development interventions might cause, and require that development planning takes necessary measures to prevent such occurrences. Whereas, "do maximum good" asks that conflict prevention be actively promoted through development interventions.

CHAPTER 8 VISION, OBJECTIVES, AND BASIC STRATEGY FOR BANGSAMORO DEVELOPMENT

8.1 Key Concepts Derived from BDP I

8.1.1 Transition from BDP I

The Bangsamoro Development Plan Phase I (BDP I) for transition period up to 2016 provides the point of departure for the present JICA Study, which will develop a medium to long term development plan for Bangsamoro (BDP II). Only limitation of the Study is that it covers the thematic areas designated to JICA as described in Sub-section 1.2.1. Specifically, the Study covers economic development and related infrastructure development for the Bangsamoro encompassing agriculture, agro-industry, fishery and related industry; and logistic infrastructure including ports, airports, and roads for specific projects, programs and institutional measures; and power supply and river and flood control for policy and development directions. Environmental considerations are reflected in development planning, and GIS is used as a planning tool.

The Integrative Report of BDP I published in early 2015 has been fully reviewed and reflected in the formulation of the BDP II in all the designated thematic areas and related sectors. As part of the review, the results of consultative meetings including sessions with constituent local governments and focus group discussions were reviewed to extract issues and problems identified by stakeholders participated in different meetings. They are used to develop concepts and vision for Bangsamoro development and to establish development objectives and basic strategy.

8.1.2 Key concepts for BDP

To make concerted efforts for the regional development involving all the stakeholders, it is useful to establish common concepts applicable to the regional development that can be shared by all the stakeholders. Important common concepts are presented as shown in Figure 8.1 to facilitate sharing by all the stakeholders in the Bangsamoro region. These concepts have been derived from the BDP I as described above, but expressed in the way to reflect the characteristics of the Bangsamoro clarified by the analysis on existing conditions by sector as part of the JICA Study. Each concept is explained.

Bangsamoro development is to be pursued through

Broad-based inclusive development,
Alternative socio-economy on tradition,
Natural resources management,
Good governance,
Self-reliant regional development,
Agro-based industrial clusters
Mixed ethnicity for diversity
Outward oriented development
Resilient and robust society
Organizational strength with unity

Figure 8.1 Key Concepts for Bangsamoro Development Derived from BDP I

Inclusive development is a main principle to guide the BDP. To alleviate wise spread poverty existing at present with the highest poverty incidence of all the regions in the Philippines, however, broad-based approach is necessary to link livelihood activities by the poor to main stream economic activities. **Broad-based inclusive development** represents these concerns. It is in fact the main theme of the BDP I.

Alternative socio-economy on tradition represents the concern by people in the Bangsamoro to pursue asymmetric relationships with other regions rather than just following the footsteps of more advanced regions. It should guide the Bangsamoro development to pursue such development model unique to the Region by utilizing its indigenous resources. Such alternative socio-economy, to be elaborated below, should effectively utilize traditional skills and wisdom to be enhanced by advanced technology.

To support the alternative socio-economy, rich natural resources in the Region should be effectively utilized, and a prerequisite is proper **natural resources management**. Proper resources management to support the alternative socio-economy would be made possible by **good governance**. All in all, **self-reliant regional development** should be realized, whereby indigenous resources would be utilized by, and for the benefit of local people and communities.

Development of **agro-based industrial clusters** provides a viable means to realize self-reliant regional development with broad-based inclusive development, alternative socio-economy, and proper natural resources management. Agro-based industrial clusters would link livelihood activities by the poor through indigenous industries to export industries, generating large number of employment opportunities and attaining high value-added without increasing environmental stress in line with the concept of alternative socio-economy.

The Bangsamoro region accommodates peoples of widely different ethnic, socio-cultural, religious and other backgrounds, including indigenous peoples (IPs). Mixed ethnicity is taken to be a positive factor as it would contribute to diversity of human resources, economic activities, social systems and infrastructure facilities and enhance resilience and robustness of the Region. **Mixed ethnicity for diversity** implies these widely varied opportunities.

The Bangsamoro region is strategically located for trade within the Islam society extending from the Indian Ocean to the Pacific Ocean as its history shows. Such a position would become more important as the trade in broad region of the BIMP-EAGA is recognized increasingly. To utilize this position effectively, the Region should pursue **outward oriented development** as elaborated subsequently. Service activities related to trade represent non-resource intensive and high value-added economic activities fit well with the concept of alternative socio-economy.

The BDP I aims to build foundations of functioning *peace economy* that will strengthen institutions, promote access to opportunities and jobs in the Bangsamoro region and its adjacent regions. To pursue this under socio-politically uncertain and unstable conditions, the Bangsamoro region should build a robust society with respect to institutions, economic structure, justice system and other aspects. The Region is disaster prone suffering from habitual floods, occasional earthquakes, erosion and landslides and others. The regional society should anticipate these disasters and prepared to respond to them to minimize damages. **Resilient and robust society** represents these characteristics of the Bangsamoro region.

To realize its development potentials for the benefits of peoples in the Region, most important concept is **organizational strength with unity**. This concept is the key to realize just, peaceful and prosperous society of empowered people and communities supported by responsive, participatory and transparent governance systems, reflective of the Bangsamoro's distinct cultural identity, and rights to fiscal and political self-determination.

These key concepts and relationships between them are illustrated in Figure 8.2.

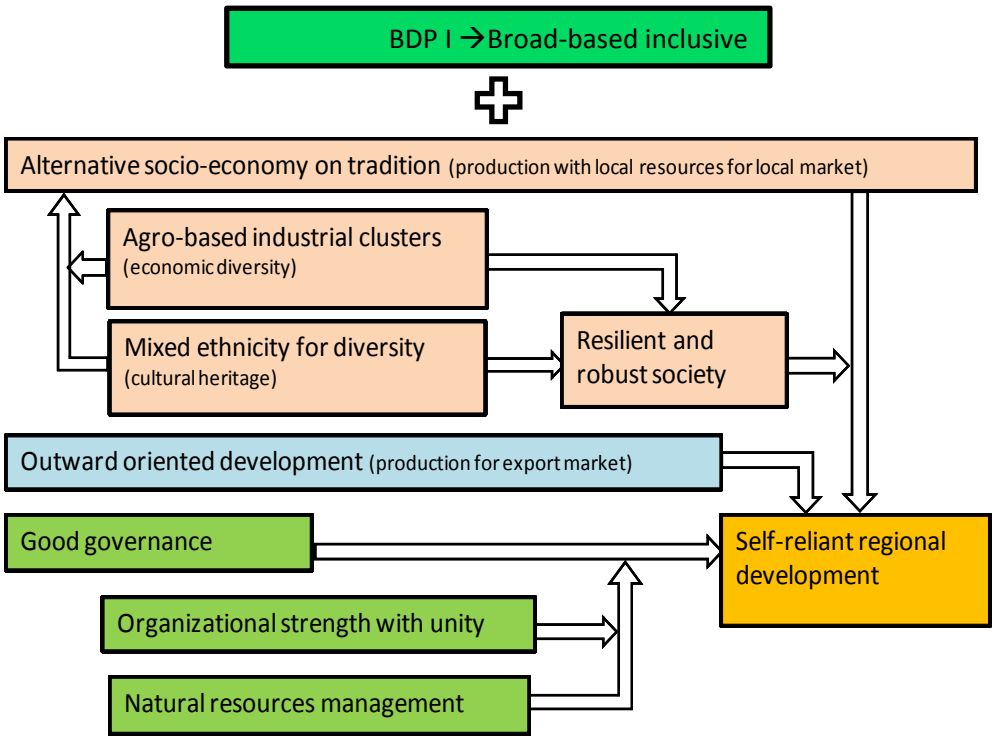


Figure 8.2 Key Concepts of Bangsamoro Development Plan and Their Relationships

8.2 Development Directions

8.2.1 Alternative socio-economy

The Bangsamoro region is a poverty stricken region having the highest poverty incidence in the Philippines due mainly to the 40-year long conflicts and inadequate support from the Government. Another factor accountable for the poverty situation is distance from advanced regions of the Country. Mindanao itself is located far from the most advanced central regions, and within Mindanao, the Bangsamoro is located far from other advanced parts of Mindanao.

Given these conditions, measures to alleviate poverty relying on trickle down effects of economic development will not be effective. More broad based poverty alleviation should be pursued, which would link livelihood activities by the poor to main stream economic activities. This is considered necessary to realize inclusive and equitable development

To plan for main stream economic activities, indigenous resources should be effectively utilized, including not only physical resources but also historical and geographic position of the region as well as socio-cultural resources. Recently, many sporadic efforts have been made in both developed and developing countries to pursue forms of alternative socio-economy. This is reflection of concerns on many serious social and environmental problems caused by resources intensive and economic efficiency-oriented development during the 20th century. Such alternative socio-economy should also be pursued to make it fit to the Bangsamoro development.

The following conditions may characterize alternative socio-economy particularly in the developing countries' context:

1) Less resource intensive economic activities,
2) Economic activities with smaller environmental stress,
3) Economic activities ensuring large employment generation and maximizing value-added,
4) Local mechanism to allow resources management by local people and society, and
5) System of appropriate technology complementing traditional techniques with advanced technology.

These conditions are mutually related to one another. Condition 1) of less resources intensive economic activities contributes to Condition 2) of smaller environmental stress by effective utilization of resources with minimal wastes. Such economic activities that satisfy these conditions engage larger number of people to utilize wastes and byproducts and thus contribute to Condition 3). To promote these economic activities as a whole, it is desirable that a mechanism for managing resources by and for the benefit of local people and society exists as Condition 4) requires. To support such alternative socio-economy, a system of appropriate technology should be established by combining traditional techniques and advanced technology as Condition 5) requires.

8.2.2 Applicability of alternative socio-economy to Bangsamoro

It is considered particularly relevant for the Bangsamoro development to satisfy these conditions of alternative socio-economy. Although the Region is endowed with various mineral resources, development of these resources by introducing massive foreign capital may not be in line with self-reliant regional development. Many large agribusinesses already established in Mindanao are expected to expand into Bangsamoro, but how to make them benefit local people pose major challenges.

Large number of employment opportunities should better be generated without much stress on environment and at the same time higher value-added should be attained in line with the idea of alternative socio-economy. In this way, inclusive development may be realized with broad-based poverty alleviation, and socio-political stability may be strengthened in compliance also with the "Do No Harm" principle.

The Bangsamoro region may also pursue outward oriented development capitalizing on its characteristics with the island provinces and the main land facing the sea. Its position is considered favorable also in relation to the Brunei-Indonesia-Malaysia-Philippines East Asia Growth Area (BIMP-EAGA) region. Outward-oriented development based on trade with neighboring regions and countries is also a form of less resources intensive development.

In pursuing alternative socio-economy, vertical industrial clusters based on primary products may be very effective to link livelihood activities by many local people to viable economic activities competitive in the global market. The Philippine Government has adopted the industrial cluster development strategy throughout its territory, and JICA has been supporting this strategy by the National Industrial Cluster Capacity Enhancement Project (NICCEP) for the period from February 2012 through March 2015 (Box below). By this project, promising industrial clusters have been identified in the Bangsamoro region as well.

In the Bangsamoro region having the highest poverty incidence but favorably located in relation to neighboring regions and countries, the industrial clusters would be very effective to link livelihood activities by the poor, through indigenous industries, to the global markets. In fact, industrial clusters may effectively link the strategy to pursue alternative socio-economy with the strategy to pursue outward oriented development. To support these socio-economic activities, integrated transport complex system should be established and strengthened, and development administration should be strengthened by broad capacity development.

8.2.3 Localization vs. globalization

In comparing the broad development alternatives, they have to be set in the same context of the present socio-economic development worldwide, characterized among others by free trade and economic globalization. In the globalizing economy, the localization model of development based on indigenous resources and local markets alone cannot work effectively. In fact, such self-contained closed societies cannot exist under the globalization for the following reasons. When better products are coming in from outside at lower prices, no one can say not to buy them but to buy local products of low quality at higher prices. Another reason is that local products have to compete against products from other regions or countries still pursuing the 20th century development model. At least in a short term, local products would lose against such imported products produced in a more efficient way with more resources used and more wastes generated.

Box: Industrial cluster development strategy by the Philippine Government and JICA technical support

The Philippine Government has adopted the industrial cluster development strategy throughout its territory. JICA extended the first technical cooperation by the Davao Industrial Cluster Capacity Enhancement Project (DICCEP), implemented during October 2007 through June 2010. This initial success led to the National Industrial Cluster Capacity Enhancement Project (NICCEP) for the period from February 2012 through March 2015. This technical cooperation covered Regions IX, X, XI and XII in Mindanao, but ARMM was not included.

Abaca cluster was promoted for Region V with the following:
- Project 1: Production increase and quality improvement of abaca fiber,
- Project 2: Products and market development, and
- Project 3: Skills development for fiber extraction, processing and marketing.

Lessons learned are summarized as the following conditions for the success of the industrial cluster approach:
1) Collaboration mechanism: private sector initiative,
2) Coordination between government organizations: RDC, value-chain concepts,
3) Use of easy-to-use tools for analysis, planning and evaluation,
4) Identification and cultivation of local coordinators, and
5) Implementable plan preparation with clear division of works.

This strategy has been extended to ARMM, and the ARMM Industry Clustering Capacity Enhancement Project (AICCEP) has been implemented under the CCDP-Bangsamoro. The project covers coconut and oil palm in Maguindanao, abaca in Lanao del Sur, rubber in Basilan, coffee in Sulu, and seaweed in Tawi-Tawi.

Generally, four broad alternatives are conceived for regional development by combining resources and markets as shown in Figure 8.3.

		Market	
		Local	Export
Resources	Local	A	B
	Import	C	D

Alternative: *A*: Import substitution
B: Export promotion
C: Import processing
D: Export processing

Figure 8.3 Broad Alternatives for Regional Development

Alternative A corresponds to the localization model. It implies the development based on local consumption of local products, but it may be applicable only to limited products as suggested below. Alternative C is applicable when local market is significantly large. Alternative D represents typical export processing, which does not automatically ensure promotion of indigenous industries. For self-reliant regional development, Alternative B is most valid. A key for success under this alternative is to create specialty products having export competitiveness.

The Bangsamoro development should pursue in principle outward oriented development as stated already. This, however, does not contradict with the localization model for *local consumption of local products*. The extent this idea is applicable, however, needs to be carefully examined.

For water supply for instance, use of shallow groundwater as local resources as well as extraction of river water should be examined carefully to avoid costly development of water resources by large dams and transfer of water from remote areas. Renewable energy including biomass, mini hydro, wind and solar power should be emphasized as local energy sources. Further, indigenous resources related to local society, culture and heritage should be utilized to create niche markets for tourism and specialty products. These resources may be utilized for outward oriented development to vitalize the regional socio-economy supported by local governments and residents.

8.2.4 20th century development model vs. alternative socio-economy

Economic development during the 20th century supported by technological innovation derived from the industrial revolution allowed developed countries to realize improved living conditions and higher income levels. These conditions were made possible basically by resources intensive and economic

efficiency oriented development, which is represented by extraction and use of fossil fuel resources and mass production.

In this process, most developing countries were effectively regarded as resources supplying countries or economies supplying specialized primary products, respectively. They enjoyed limited benefits of such development such as employment generation, while self-reliant economic development was not realized.

The resources intensive and economic efficiency oriented development in developed countries resulted in various environmental problems such as various pollution and social problems represented by degradation of rural societies and alienation of urban residents. Further, both developing and developed countries now face global environmental problems, threatening sustainability of human beings themselves.

It is recognized that trends of economic globalization and free trade are inevitable for both developing and developed countries. Economic globalization means the pursuit of economic efficiency in a world wide scale, and thus considered a necessary condition for efficient use of limited resources. When the economic globalization is pursued without considerations on distribution of economic benefits and wealth, however, social problems such as income disparities will aggravate. Also, effective resources utilization exclusively for economic efficiency will degrade environmental quality by excessive resource use and increased waste generation.

It is now essential in providing development aid to developed countries to pursue alternative socio-economy rather than applying the 20th century development model pursued by developed countries. This is particularly true as any alternative socio-economy model will have to be supported by a system of appropriate technology to be developed by strengthening traditional skills and wisdom in developing countries with advanced technology that developed countries should provide as donors.

8.2.5 Comparative analysis on two broad alternatives

The two broad alternatives are compared in Table 8.1 from a few different points of view. Historically, the 20th century development model had been pursued by most developed countries since the industrial revolution and throughout the 20th century. The alternative socio-economy had been discussed recently, and some sporadic attempts have started to be made in recent years in both developed and developing countries.

The 20th century development model sees resources as income or something to realize immediate gains. This applies typically to extraction of fossil fuel and other underground resources. This view tends to encourage abusive use of resources. The alternative socio-economy sees resources as capital, on which development will be based. Capital needs to be conserved as much as possible to support continuous development activities. Economic efficiency is the prime criterion in pursuing the 20th century development model, while the alternative socio-economy takes social and environmental considerations more seriously into account.

Table 8.1 Comparison of Two Broad Development Alternatives

	20th century development model	**Alternative socio-economy**
History	Pursued by most developed countries	Sporadic attempts started recently in developing & developed countries
Resources	Income → Abuse	Capital → Conservation
Criterion	Economic efficiency	Social & environmental considerations
Effects	Highest income possible	Largest employment opportunities
Technology	Advanced technology	Appropriate or intermediate technology

The 20th century development model, as the history proves, is effective in realizing highest income levels possible. The alternative socio-economy pays more serious attention to generating the largest employment opportunities possible. This does not necessarily mean that this model sacrifices economic growth in favor of employment generation. Methods to attain high income levels are different between the two alternatives.

The 20th century development model had been supported generally by advanced technology developed in developed countries since the industrial revolution. Advanced technology has made it possible to pursue high economic growth by intensive resource use during the 20th century. Only recently, technological innovation has started to focus on effective use of limited resources for resource recycling and saving. For resource saving methods, a lot of lessons may be learned from collective wisdom of human beings constituting traditional skills, knowledge and wisdom. In fact, traditional skills, knowledge and wisdom should be strengthened by advanced technology to develop appropriate or intermediate technology, which should support the alternative socio-economy.

8.3 Vision for Bangsamoro Development

8.3.1 Proposed vision

A vision should be established for the Bangsamoro development that can be shared by all the stakeholders including MILF, local residents, ethnic groups, supporters of the regional development such as donors and NGOs, and officers and experts of the ARMM government and LGUs. The following vision has proposed, reflecting the characteristics of the Region with rich natural and cultural resources and in line with the idea of alternative socio-economy discussed above. The proposed vision was presented on many occasions to various stakeholders for possible revision and elaboration, and it may be subject to further modification through discussions with stakeholders.

Vision for Bangsamoro Development

Realization of robust and resilient Bangsamoro socio-economy, adapting to changing world and open to the global society on the one hand and ensuring sustained peace on the other, supported by abundant natural resources, diverse economic activities and rich cultural heritage of mixed ethnicity that are managed by responsive and transparent governance systems with people's participation.

8.3.2 Conditions for Bangsamoro vision

The vision for the Bangsamoro development will be supported by

(1) Network of transport and logistic infrastructure of high quality linking the Bangsamoro region to neighboring regions and countries;
(2) Agro-based industrial clusters linking livelihood activities by the poor, through indigenous industries to export industries producing a variety of products having comparative advantage in the global market;
(3) Environment friendly and less resource intensive socio-economic activities combining traditional wisdom of peoples with modern technology;
(4) Active communities of mixed ethnicity constituting the peaceful and prosperous Bangsamoro society with revitalized conventional cultural activities that residents are proud of and visitors can enjoy; and
(5) All of the above embraced in rich natural environment under proper management by local communities and local governments to ensure just, peaceful, and prosperous society.

More specific conditions by province were analyzed as development diagnosis by province prepared through discussions with various stakeholders in respective provinces. Early drafts were discussed and verified at the second workshop. The development diagnosis by province is included as Annex to Chapter 8.

8.4 Development Objectives and Basic Strategy

8.4.1 Problem structure analysis on Bangsamoro

(1) Analytical procedure

The existing conditions in the Bangsamoro region were analyzed as part of the Bangsamoro Development Plan Phase I (BDP I) by local consultants engaged by JICA. The Final Report of the BDP I have been reviewed by the JICA Study Team (JST), and more important problems have been identified. The Bangsamoro Development Agency (BDA), based on the Final Report, has elaborated the development plan for the transition period of 2014–16 published as the Integrative Report. Their presentation material was also reviewed by the JST to identify additional problems. These problems combined would work as constraints to the Bangsamoro development.

Many of these problems are interrelated to cause undesirable phenomena as observed at present. A problem structure analysis is a method to clarify these interrelationships in a macroscopic way. The analysis, usually undertaken during the initial stage of the development planning, would allow a broad perspective without getting into details to identify more essential factors and major problems to be alleviated through planned development efforts. The analysis is used in this chapter to define development objectives and basic strategy for the Bangsamoro development.

(2) Problem enumeration

As the first step of the problem structure analysis, problems facing the Bangsamoro region are enumerated. In the present analysis, the results of the BDP I were utilized together with the presentation materials produced by BDA for the purpose (Table 8.2). A few problems were added by the JST from a macroscopic point of view. All the problems thus enumerated are listed in Table 8.2 classified by broad sector.

Table 8.2 Major Problems Facing Bangsamoro Identified by BDP I

Category	Major problems
Economic problems	1) Low agricultural productivity 2) Poor conditions of farm-to-market roads 3) Difficulty in marketing agro products* 4) Lack of assistance to farmers and fish folks 5) Low income levels 6) Dependence on limited agro products* 7) Limited manufacturing and mining activities* 8) Lack of capital accumulation in the region*
Institutional problems	9) Weak LGU capability 10) Low concern and attainment of justice and equity 11) Lack of proper attention by past administrations 12) Lack of proper law enforcement 13) Aftereffects of decades long conflicts
Social problems	14) Unstable peace and order 15) Land conflicts 16) Poor delivery of basic services 17) High poverty incidence 18) High unemployment rate 19) Social deprivation and marginalization 20) Low school participation and enrollment
Infrastructure problems	21) Poor and dilapidated road conditions 22) Inadequate port and airport facilities 23) Failure to utilize water transport 24) Unreliable and insufficient power supply 25) Low collection efficiency of power tariffs 26) Illegal power connections 27) Very low household electrification ratio 28) Poor access to safe drinking water and sanitary toilets

Category	Major problems
Environmental problems	29) Degrading forest resources 30) Unregulated small scale mining 31) Lack of data on mineral resources 32) Delay in delineation of proclaimed watershed and protected areas 33) Improper solid waste management 34) Lack of flood control program 35) Absence of disaster response and relief management 36) Geographical remoteness from other regions
Inherent problems	37) Geographical remoteness from other regions 38) Aftereffects of decades long conflicts

Of all the problems enumerated, some specific problems are combined to define a major problem so that the analysis would not lapse into too much detail. For instance, very low household electrification ratio and poor access to safe drinking water and sanitary toilets identified in infrastructure sector are represented by poor delivery of basic services in social sector. Most problems are expressed in generic terms to imply related sector problems. All the major problems thus identified are listed below by broad sector. Problems added by the JST are indicated by asterisk (*).

Economic
(1) Low agricultural productivity
(2) Poor conditions of farm-to-market roads
(3) Difficulty in marketing agro products*
(4) Lack of assistance to farmers and fish folks
(5) Low income levels
(6) Dependence on limited agro products*
(7) Limited manufacturing and mining activities*
(8) Lack of capital accumulation in the region*

Institutional
(9) Weak LGU capability
(10) Insufficient concern for justice and equity
(11) Lack of proper attention by past administrations*
(12) Lack of proper law enforcement
(13) Aftereffects of decades long conflicts*

Social
(14) Unstable peace and order
(15) Land conflicts*
(16) Poor delivery of basic services
(17) High poverty incidence
(18) High unemployment rate
(19) Social deprivation and marginalization
(20) Low school participation and enrollment

Infrastructure
(21) Poor and dilapidated road conditions
(22) Inadequate port and airport facilities
(23) Failure to utilize water and air transport
(24) Unreliable and insufficient power supply
(25) Illegal power connections

Environment and natural resources
(26) Degrading forest resources
(27) Unregulated small-scale mining
(28) Illegal logging
(29) Delay in delineation of proclaimed watershed and protected areas
(30) Improper solid waste management
(31) Lack of flood control program

(32) Aggravating flood damages*
(33) Absence of disaster response and relief system
(34) Degrading environmental quality*
(35) Remoteness from advanced regions

(3) Problem structure

With all the major problems identified, except land conflicts having deep historical roots, a problem structure has been constructed as shown in Figure 8.4. Land issues are separately discussed. In Figure 8.4, more important problem factors and phenomena are shown, expressed in generic terms to imply many detailed or sector specific problems. The figure also shows causal relationships between the identified problems, focusing only on main interrelationships. From the figure, problem factors at the bottom of many inter-related problems and problem phenomena observed are identified as described below.

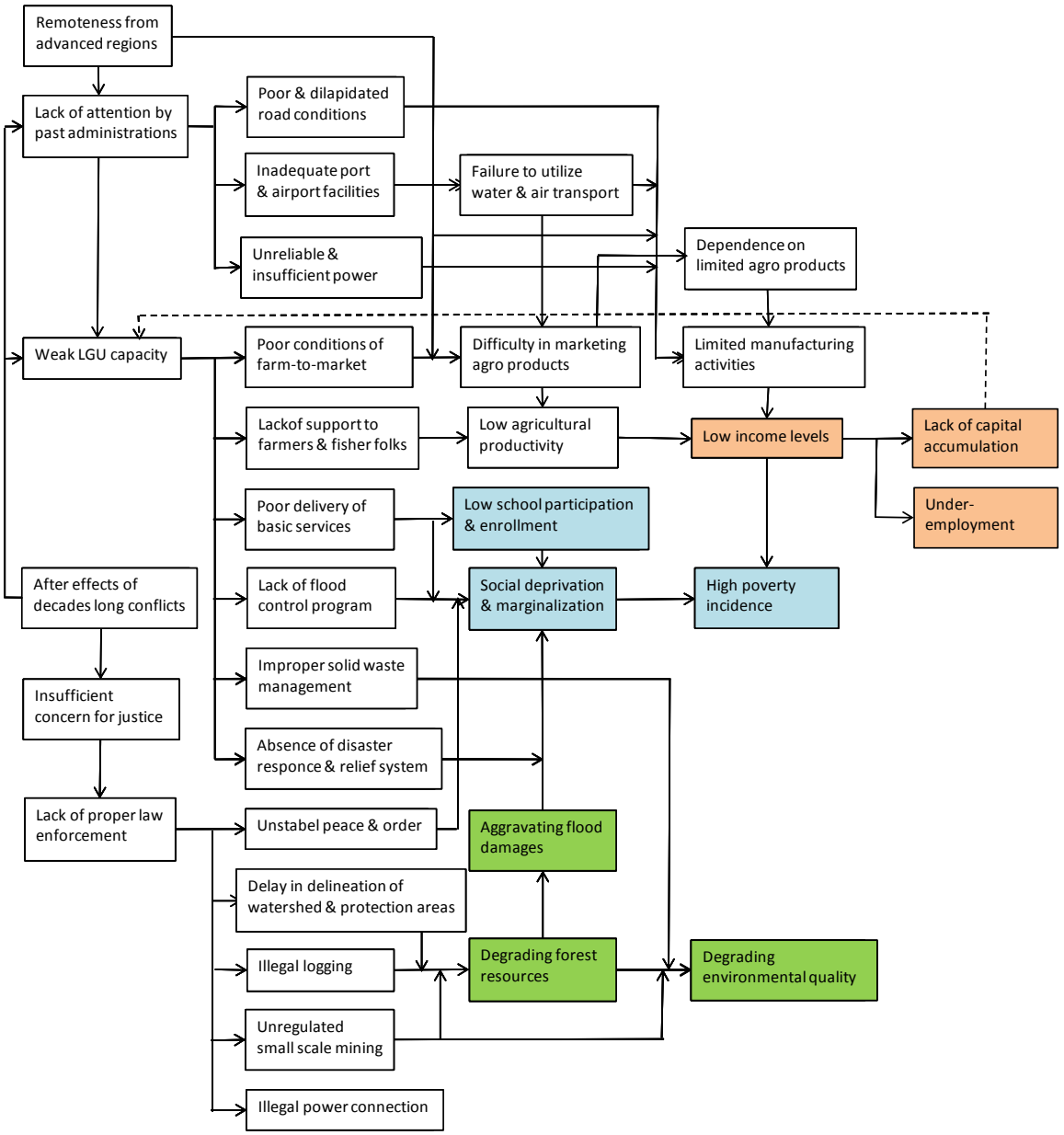


Figure 8.4 Problem Structure of Bangsamoro Development

Problem factors

As shown in Figure 8.4, problem factors may be classified into three categories. Remoteness from advanced regions is an inherent problem as the Bangsamoro region is located in the southwestern end of the national territory with many islands. The aftereffects of decades-long conflicts have resulted in insufficient concern for justice and equity and further lack of proper law enforcement. Weak LGU capacity is a result of both the decades-long conflicts and the lack of attention by past administrations.

Problem phenomena

Three broad problems may be identified, which should be alleviated through planned development efforts: economic, social and environmental problems. The economic problems are represented by low income levels, lack of capital accumulation and high unemployment rate.

The social problems in the Bangsamoro region are outcomes of the economic problems and inadequate administrations due to unstable socio-political conditions. They are represented by high poverty incidents, social deprivation and marginalization, and low school participation and enrollment.

The environmental problems have two broad aspects: forest resources and overall environmental quality. Forest resources have been degrading due to illegal logging, delay in delineation of watershed and protected areas, and unregulated small scale mining. This tends to make flooding and flood damages aggravating. Overall environmental quality is degrading also by improper solid waste management as well as degrading forest resources and unregulated small scale mining.

Problem interactions

The Bangsamoro is a dominantly agricultural region, but it depends on limited agro products. In addition to rice as staple and corn and cassava as supplemental staple and industrial crops, only a few agro products are produced including rubber, coconut, oil palm, fruits and seaweed. This is due mainly to difficulty in marketing agro products, which in turn is caused by poor conditions of roads including farm-to market roads as well as unstable socio-political situation.

This situation causes also limited manufacturing activities. Other conditions accountable for limited manufacturing activities include unreliable and insufficient power supply, under-utilization of water and air transport and remoteness from advanced regions as shown in the problem structure. For limited manufacturing activities such as latex production from rubber and palm and coconut oils manufacturing, marketing is constrained as only intermediate products are produced for shipping to designated final products producers outside the region.

At the bottom of these problems is weak LGU capacity as well as lack of attention by past administrations. These problems combined have resulted in the main economic problems as observed above. The resultant lack of capital accumulation in the region constrains the development interventions by LGUs in financial aspect. This is the major problem interaction observed in the region.

Social deprivation and marginalization identified as one of the major social problems is caused by several factors. Among the causes are unstable peace and order and low school participation and enrollment preventing participation in mainstream economic activities. Lack of flood control program and absence of disaster response and relief system as shown in the problem structure tend to make the situation worse and lasting.

Degrading forest resources caused by illegal logging, delay in delineation of watershed and protected areas, and unregulated small scale mining as shown in the problem structure result in aggravating flood damages, which take the largest toll for the socially deprived. At the bottom of these problems is lack of proper law enforcement, which in turn reflects insufficient concern for justice and equity cultivated during the decades long conflicts.

8.4.2 Development objectives and basic strategy

(1) Objectives for Bangsamoro development

Three problem phenomena have been identified by the problem structure analysis. Corresponding to

these, three objectives may be defined for the Bangsamoro development. They are proposed to be expressed as follows:

1) Economic objective: To pursue inclusive economic growth with diversified and viable agro-based employment and income opportunities to improve livelihood, increase local capital accumulation, and enhance competitiveness of regional economy in the globalizing economy.
2) Social objective: To revitalize local communities of empowered people to realize peaceful, equitable and just society without dropouts or outlaws, and responsive and transparent governance system with people's participation.
3) Environmental objective: To protect and enhance the environmental quality to ensure sustainable human and economic development, safeguard the traditional lifestyles and value, and ensure lasting peace.

(2) Basic strategy for Bangsamoro development

Basic strategy for the Bangsamoro development may be established in reference to the problem factors at the root of many interrelated problems analyzed by the problem structure analysis. They are as follows: (a) the Bangsamoro region has a disadvantage that it is located at the southwestern end of the National territory far from advanced regions; (b) the region suffers from the aftereffects of decades long conflict, which has undermined the concern on justice and equity resulting in weak law enforcement; and (c) capacity of LGUs is low to provide basic services and socio-economic infrastructure, and to ensure proper environmental and resources management.

Therefore, the following are proposed as four components of the basic strategy:

1) Pursuing outward oriented development by turning the disadvantage of remoteness into the advantage of proximity to neighboring regions in Mindanao and countries of the BIMP-EAGA;
2) Re-instating the traditional justice system combining the Shari'ah law and common criminal laws, observing also traditional rights of indigenous peoples (IPs);
3) Establishing mechanism for broad-based participation of all stakeholders in the process of development planning and implementation; and
4) Promoting alternative socio-economic activities, which are less resource intensive and environment friendly, combining traditional practices and modern technology.

The basic strategy with the four components together will help to attain not only the economic objective but also the social and the environmental objectives as defined above. In particular, it will suppress and prevent conflicts and ensure peace by providing safeguards in the forms of large number of lucrative employment opportunities, proper justice system observing traditional customs and value including rights of indigenous peoples, and participatory environmental and resources management.

8.4.3 Land-related issues and strategy

(1) Institutional frameworks for land issues

The Framework Agreement Bangsamoro (FAB) recognized that the resolution of land conflicts as a condition to a lasting peace. Under the Part IV, 2 & 3, the FAB provides for measures on addressing the land issues stating among others the recognition of grievances and the restoration of rights over properties unjustly taken away. This FAB provision is an important measure to take towards development of the Bangsamoro area by way of putting vast tracts of land under productive use.

The Bangsamoro Basic Law (BBL) is expected to provide a new framework to resolve land issues specific to Bangsamoro. In principle, land registration in Bangsamoro is stipulated to be undertaken in accordance with the land registration system of the Central Government (Article V, Section 2). For land management, the classification of public lands into alienable and disposable (A&D) lands shall be initiated and recommended by the Bangsamoro Government to the President for timely implementation Bangsamoro development plans and targets (Article V, Section 3). Also, the Bangsamoro Government shall have the authority to conduct cadastral surveys, lots surveys and isolated and special surveys in Bangsamoro.

The BBL is expected to respect vested property rights of IPs and traditional communities. Its draft stipulates as follows (Article IX, Section 3):

> With respect to legitimate grievances of Bangsamoro people arising from any unjust disposition of their territorial and proprietary rights, customary land tenure or their marginalization shall be acknowledged. Whenever restoration is no longer possible, the Central Government and Bangsamoro Government shall take effective measures for adequate reparation of the loss in such quality and quantity and status collectively beneficial to the Bangsamoro people, and to be determined mutually by both Governments

(2) Land issues specific to Bangsamoro

Resolving land related conflicts is a prerequisite to realizing a lasting peace and sustainable development in Bangsamoro. For the purpose, many existing problems need to be overcome and proper legal and institutional arrangements should be establish to minimize anticipated problems.

The existing problems include the following:

1) Torrens titling system that cannot deal with communal land ownership,
2) Multiple agencies involved in land management and land titling processes, resulting in multiple land ownership,
3) Complexity and costliness (and perceived unfairness) of formal land markets resulted in informal land market and multiple transfers and competing claims,
4) Many people displaced from their original lands due to violent struggle (rido or feud), and
5) Insufficient fund and human capacity for cadastral surveys.

(3) Bangsamoro land management strategy

Multiple agencies involved in land management with their roles and related issues in Bangsamoro are summarized in Table 8.3. Some conditions specific to Bangsamoro make the resolution of land issues difficult and complicated. The historical context of conflicts between the Moro people and the Central Government made them skeptical of land registration as a means to impose taxes. There was no room for registration of communal lands under the American (Torrens titling) system. LGUs are reluctant to cooperate with the land surveys as it may result in reduction of IRA.

Establishment of proper legal and institutional arrangements to deal with land issues will involve some fundamental changes. First, multiple powers on land administration system should be streamlined and consolidated. This cannot be realized anymore in the main land, due to political complexity as many reports say, but only Bangsamoro remains the possibility. The multiple administration system committed by LRA, LMB, FMB, DAR, and NCIP is the firstly issue to be addressed.

Eventually, a new institution that may be called the Bangsamoro Land Management Office (BLMO) should be established. Consolidation of five land management agencies is quite a political issue, which cannot be expected under the present administrative structure. It is expected the Bangsamoro government will proceed with this activity under the Chief Minister of Bangsamoro Parliament, and to secure neutrality, international and bilateral donors should act as observers.

A prerequisite to establishing the new institutions for land management is to cultivate wide understanding on importance of resolving land issues among the top management of MILF, LGUs and residents. As there remains room for further negotiation with the Central Government related to land registration and management, it is essentially important for Bangsamoro to start making concerted efforts based on the common understanding. For the purpose, the information function of the Bangsamoro Government would be critically important.

The new institutions for land management should be supported by strengthened judicial systems for land issues. As the first step, the ongoing Agrarian Justice Delivery program by DAR should be reviewed to extract lessons. Based on the review, a new judiciary system should be designed to make it fit to conditions in Bangsamoro. This system would be based on the traditional system combining the Shari'ah law and common criminal laws, observing also traditional rights of indigenous peoples (IPs) and communal ownership of lands.

Table 8.3 Government Agencies Involved in Land Management and Related Issues in Bangsamoro

Agency	Roles	Issues in Bangsamoro
Department of Environment and Natural Resources (DENR)	To delineate public lands To issue free, homestead and sales patents to A&D land	Bangsamoro Government may re-delineate A&D land and protected areas.
Land Management Bureau (LMB) of DENR	To distribute public A&D lands using patents	Multiple agencies are involved in issuing patents. LMB in ARMM is grossly under-funded.
Forest Management Bureau (FMB), DENR	To issue titles in forestland by CBFMA and IFMA	Bangsamoro Government may re-delineate forest land.
Land Registration Authority	To deposit *mother title* with the Registry of Deeds (ROD)	Land registration in Bangsamoro is stipulated to follow the registration system of the Central Government, which may not fit to communal land ownership.
Department of Agrarian Reform (DAR)	To re-distribute private lands and some government lands under CARP To issue emancipation patents for rice and corn land To issue certificates of land ownership award (CLOA) for registration with ROD	Needs for land registration and cadastral surveys shall be understood widely. Sufficient fund shall be secured for cadastral surveys. Rights of people displaced by armed conflicts, communal land ownership and ancestral domains of IPs shall be respected and reflected in the CARP procedure. Lessons shall be learned from AJD program.
National Commission on Indigenous Peoples (NCIP), Presidential Office	To issue instruments over lands in ancestral domains	Rights of IPs for their land in ancestral domains shall be respected, and compensation and sharing arrangements shall be established.
Court (Barangay, Civil, Shari'ah courts)	To settle ownership claims for reflection in registered titles	Judicial system for resolution of land conflicts shall be strengthened encompassing barangay, civil and Shari'ah courts.
Local government units (LGUs)	To collect real property taxes To enforce land use laws and ordinances	LGUs shall cooperate for cadastral surveys, understanding the needs.

Annex to Chapter 8: Development Diagnosis by Province

Development diagnosis is conducted by province. Existing conditions are examined to draw a balanced picture of each province at present, major constraints to development are identified, and promising prospects for development are presented. Bases of the analyses are basic data collected and discussions with the respective provincial governments and other stakeholders as well as limited field observations.

Prospects as originally presented contained working hypotheses that have been examined by further analyses with additional data and information. The diagnosis has been modified, reflecting the discussions and ideas on development directions during the workshop.

A.1 Maguindanao

A.1.1 Existing conditions

(1) Location and land

Maguindanao province is located at the western end of the Mindanao mainland, facing the Moro Gulf to the west. The total land area of the province is 7,547 km according to the Regional Physical Framework Plan (RPFP): 2000–2030 of ARMM. The central part of the provincial territory is occupied by the river basin of the Rio Grande, the largest river in Mindanao.

Designated forest land covers 2,234 km^2, accounting for 29.6% of the provincial land, but the forest cover is reported to be only for 523.5 km^2 in 2012 according to the Maguindanao Socio-economic Profile (MSEP). While illegal logging by using heavy machinery no longer exists, timber pouching is reported in Ampatuan, Datu Abdullah Sangki and Sultan sa Barongis according to hearings from the provincial government. The area of forest cover, however, increased from 163.5 km^2 in 2003. The large share of forest land may be due to shrub/bush land or marsh land occupying the lowland areas of the Rio Grande main stream. The apparent increase in forest cover may reflect expansion of plantations.

Agricultural land accounted for 29.2% of the provincial land, leaving 40.6% of the provincial land as alienated and disposable land. The ratio of the alienated and disposable land is the largest of all the provinces in Bangsamoro. Substantial part of the alienated and disposable land has been effectively utilized for agriculture, and the agricultural land use covers 360,340 ha or 47.8% of the provincial land according to the MSEP.

The remaining land uses consist of pasture land covering 85,448 ha or 11.3% of the provincial land, 61,088 ha or 8.1% of marshes/lakes, 22,680 ha or 3.0% of buildup areas, and other land uses for 1,376 ha. Most part of marshes/lakes area is the Ligawansan marsh along the lower reaches of the Rio Grande.

Proclaimed watersheds are Kabulnan watershed, South Upi watershed and Dimapatoy watershed covering an area of 10,385 ha, located in the municipalities of Ampatuan, Datu Abdullah Sangki, Shariff Aguak, South Upi and Datu Unsay. These watersheds are the source of potable water and water for the irrigations.

(2) Demography

Population in Maguindanao was 944,718 at the 2010 census. The working age population was 512,982, accounting for 54.3% of the total population. This ratio is much lower than observed in most countries, and implies large number of young population. Median age was in fact 17.6 years in 2010, decreased from 18.5 in 2000.

The average household size increased from 5.6 in 2000 to 6.0 in 2010, implying the provincial population increased by some 60,000 during this 10 year period. This does not reflect in population growth rates, meaning outmigration was also significant during this period. The average household size, however, varies widely ranging from 6.38 in Buluan to 2.03 in Datu Saudi Ampatuan. Of the total population at the 2010 census, male accounts for 51% and female 49%.

According to the official statistics, crude birth rate in 2012 was 27.2 per 1,000 live births in the province (MSEP). Crude death rate reported in the statistics is questionable. With the reported crude birth rate, the natural population growth may be more or less 2.0% per annum, substantially higher than the observed population growth as reported.

There are a few reasons for low population growth and low ratios of working age population in recent years despite the large increase in births. Probably, employment seeking outmigration is not significant as the sex ratio is 104. Victims of armed conflicts and displacement by conflicts are mainly responsible for the low ratios of working age population together with the increasing number of births in recent years.

Overseas workers are reported to be 11,505, of which 73% are female (MSEP). They are mostly from interior barangays of the province, according to hearings from the provincial government.

(3) Social services

Maguindanao has 508 barangays, of which only 194 barangays, 38% of all the barangays, have health stations. This coverage ratio is considerably lower than the average in Bangsamoro. According to the RPFP of ARMM, 46.7% of households have access to health facilities. The province has six hospitals, 23 rural health units as well, but no tertiary hospital exists.

Pupil-to-teacher ratios are 74.4 in District I and 53.3 in District II of the province, and pupil-to-classroom ratios are 69.0 in District I and 54.0 in District II at the elementary level. These are considered inadequate by the Philippine standard of 45 pupils per teacher. Pupil-to-teacher ratios are 53.0, and pupil-to-classroom ratios are 66.7 at the secondary level, which are also inadequate. In view of the rapid increase in young population, education capacities should be much expanded with respect to facilities and staff capacity.

Access to potable water is reported to be 56% of households in 2013, representing a slight improvement from 55% in 2000. DILG-ARMM has an ongoing potable water program for municipalities and barangays. Datu Unsay has the highest ratio of households with access to potable water at 93%, followed by Buluan at 81% and Buluan at 68%. The lowest access is at 25% of households in Paglat. Households with sanitary toilets peg at 42.5% or 67,029 households in 2013 with complete basic sanitary facilities accounting of 40.3% or 63,559 households (MSEP).

(4) Economy

The population density in Maguindanao is calculated to be 125/km^2. Four areas of population concentration are identified in the province. First, Maguindanao lowland covers municipalities of Datu Sau Ampatuan (population density 338/km^2 in 2010), Mamasapano (262) and Rajar Buayan (242). This is basically a productive paddy area, which includes also Datu Piang. The second area of population concentration extends in the municipalities of Pandag (162), Datu Paglas (154) and Mangudadatu (151) in the southeastern corner of the province. This is an area for productive plantations mainly of banana and oil palm. The other two areas of population concentration are the coastal area close to Catabato City including the municipalities of Datu Odin Sinsuat (165) and Matanog (159), and the municipality of South Upi (195).

Agricultural land occupies 360,340 ha in Maguindanao planted mainly with corn, paddy and coconut. Other commercial crops include banana, mango, coffee, oil palm, cassava and kangkong. In addition, an edible green leafy vegetable abundantly grows wildly on swamps and marshy lands of rivers and lakes. Harvested areas of corn and paddy and planted areas of other major crops add up to 449,068 ha, implying the crop intensity of 1.25. Mixed farming of coconut and corn under coconut trees is widely observed in the province. Presently there are bearing oil palm and mangoes in Ampatuan, Datu Abdullah Sangki, Talayan, Datu Unsay, Datu Saudi Ampatuan, Guindulungan and Datu Odin Sinsuat.

As a new activity, organic rice production is piloted in Mamasapano with 50 ha, according to the municipal agriculturist of Mamasapano. The banana plantation of La Frutera located in Buluan has a total area of 1,500 ha, according to the manager of La Frutera. In the municipality of Datu Paglas, there is now a 750 ha area planted with Cavendish banana. Oil palm and coconut are also abundant in

the areas of G. S. K. Pendatun and Paglat. Mangudadatu has an ongoing suitability soil testing for proposed Cavendish banana.

Livestock population decreased drastically from 2010 to 2012 for carabao, cattle, goat and chicken. In particular, goat population decreased from 108,772 in 2010 to only 25,100 in 2012. The decreases are due mainly to harsh climatic conditions and conflicts. Only duck population increased from 210,170 in 2010 to 335,871 in 2012. Production of Peking ducks has been successful, according to the provincial government. Production of native ducks or Pateros ducks has been successful, as additional income for farmers according to the provincial government. Aside from additional earnings from their eggs and meat, ducks help the farmers of providing natural fertilizer, oxygenating the water, and eating the insects and shells which are pests in the rice fields.

Fisheries are important economic activities in Maguindanao. Fish production in the province is dominated by aquaculture and seaweed production. Commercial fishery and marine and inland municipal fisheries account for small portion of the total fishery production. Milkfish is cultured in Buluan Lake and during harvest there is tilapia as byproduct of the milkfish culture using fish cages. Milkfish farmers are dependent on the natural food of the lake, and they use feeds only on the early weeks of the fry or fingerlings (acclimatization period).

Open sea fishery production appears to be small in the statistics presumably as most products are shipped to nearby provinces where they can get good prices, usually going to North Cotabato and Davao Sur and Norte. They are not bringing their catch to General Santos City for it will compete with the abundant catch of the city and the prices are low, according to Mayor of Datu Blah Sinsuat, who is in tuna fishing business. Fish ports for marine fish catch play an important role in monitoring fish catch, which is presently not conducted in Maguindanao.

(5) Infrastructure

The total road length in Maguindanao is 400.6 km, which makes the road density 0.53 km/km^2 (MSEP). Of this length, only 41.0 km is concrete paved. Including gravel paved road length of 274.2 km, the paved road ratio is 79%, which is comparable to the paved ratio of national roads in the ARMM region.

DPWH Maguindanao Engineering District 2010 showed that 60 km national road traversing the province needs immediate rehabilitation, while 30 km needs to be concreted particularly on the Midsayap–Makar national road at Pagatin–Sutan sa Barongis section. Of the total of 376.3 km provincial roads, 2.5 km or merely 6.2% were concreted, while 292 km or 77.6% were gravel roads and the remaining 57.2 km were earth roads. Newly opened is a 16 km provincial road, and concreting of 15.3 km municipal road is ongoing (Maguindanao CDP-ELA2011-2016). With the ongoing concreting from Parang to Barira and from Barira to Buldon and Matanog, from Buluan to Pandag G. S. K. Pendatun and Paglat, and at Rajah Buayan to Sultan sa Barongis, all these will increase the municipal concrete paved road of Maguindanao.

The Polloc port located in Parang is the major port for Bangsamoro as a whole. The port started operation in 1980 under the management of the Philippine Port Authority until 1997. Then the management of Polloc port was transferred to DOTC-ARMM, by the virtue of Executive order no.435 on August 28, 1997. By virtue of MMA Act No. 154, Proclamation No. 1, on March 15, 2010 it was converted to a Freeport by REZA. It has a warehouse, terminal building and container yard, and the port hinterland is designated as a free port. It has a wharf of 400 m length but no crane exists. Water depth is about 12 m, more than sufficient as a regional port. Construction of the perimeter fence with one gate, rehabilitation of the transit shed and installation of mooring bollards all in a hundred million pesos are now on the pipeline.

There exist seven national irrigation system in Maguindanao with combined command area of 18,760 ha. In addition, many small communal and pumped irrigation systems exist in the province. Operational communal irrigation systems cover 43 command areas for combined area of 6,602 ha. Most pumped irrigation schemes are non-operational, and two operational schemes cover only 27 ha. CDP-ELA Maguindanao mentioned of the need to upgrade the existing NIA and CIS schemes to booster rice production of the province, and according to DA-BFAR ARMM, there are still available 80,000 ha for rice production that also needs irrigation.

A.1.2 Constraints

Maguindanao has an inherent constraint in pursuing sustainable development due to the fact that the upper catchment areas of the Rio Grande and its tributaries are outside the provincial territory. In the upper catchment areas, degradation of forest resources has been proceeding including expansion of banana, oil palm and other plantations. Most municipalities in the forested areas and even in the coastal areas do not have concrete forest or coastal environmental management plan. ARMM itself do not have a declared marine sanctuary to address the dwindling fish catch of the marginal fishermen and the destruction of fish habitats.

Siltation in the Rio Grande and its tributaries has been increasing to raise the river beds and aggravate flooding in the downstream reaches in Maguindanao. An extensive area along the Rio Grande and its tributaries is identified as flood prone areas.

The Ligawansan marsh along the lower reaches of the Rio Grande is both a valuable asset and another constraint to the development of Maguindanao. As the riverbeds are raised due to increasing siltation as described above, magnitude of flooding is increasing and extent of floods tends to be larger and longer lasting. This also prevents more effective use of the marsh areas for crop production and other purposes.

The growth of water hyacinth in Ligawasan marsh and other water bodies contributes to the clogging of the rivers especially when it reaches the pylon portion of the bridges. The water hyacinth with long roots and silt blocks the water flow and also raised the water level especially during high tides. This always happens at Pulangi River portion of Rio Grande de Mindanao.

Other than the marsh areas, flat lowland is limited in Maguindanao and used already for paddy cultivation. Room for expansion of paddy and field crops cultivation is very limited. Upland areas of the province are used for tree crops such as coconut and oil palm and fruits, mainly banana. Plantations are expanding in these areas. Severe erosion is observed in the upland areas, particularly in the southwestern part of the province. Protected forests are limited in Maguindanao, and the area covered by forests, not including the area of plantations is decreasing.

Other than floods, Maguindanao is vulnerable to other natural disasters as well. They include landslides particularly in the south-western part, and liquefaction prone areas extending in the southeastern part of the province. Also, the province tends to be affected by volcanic activities in and around its territory. Mt. Ragang on the boundary of the provinces of Lanao del Sur and Cotabato in ARMM has an elevation of 2,815 m (9,236 ft) and a base diameter of 32 km (20 mi). It is the most active volcano on Mindanao, and is part of a string of volcanoes in what volcanologists call the Central Mindanao Arc. It is one of the active volcanoes in the Philippines, which are all part of the Pacific ring of fire. Mount Ragang is located.

Still poor infrastructure and basic services pose a critical constraint to the provincial development. While conditions are comparatively better in Maguindanao than in other provinces in Bangsamoro, the provision of education and health services, water supply and sanitation as well as roads and other infrastructure are less adequate than in other regions. At the root of these conditions are weak capacity of the provincial government and local administrations with respect to financial capacity and workforce.

A.1.3 Prospects

(1) Soil suitability for crops

Maguindanao is covered largely by sedimentary and metamorphic rock types, except the northern part and part of the southwest covered by igneous/volcanic rock types. Soil conditions derived from the sedimentary rocks are generally favorable for crop cultivation. Of all the soil types found in the provincial land, San Miguel loam is most widespread and suitable for a range of tree crops and cassava as well as rice and corn. Gently sloping land between lowland and mountains in the southwest, covered by Paraon clay loam, may be suitable for cultivating banana and abaca. This area is found in the municipalities of Datu Odin Sinsuat, South Upi and Upi.

(2) Mixed and integrated farming

Mixed farming combining tree crops and field crops should be further promoted in the province. This model is in line with the idea of alternative socio-economy as it increases both value-added and employment opportunities. Combination of coconut and corn is already widely observed. In the northern part of the province along the coast, coconut trees are widely planted without much use under the trees. Coconut with bananas and coconut with mangoes also widely observed from Datu Odin Sinsuat to Datu Abdullah Sangki.Corn and leguminous fodder crops may be introduced in this area. Cassava may also be combined with coconut trees. For productive reforestation, coconut and oil palm may be combined with shade crops such as coffee and cacao.

Another option may be to introduce goat keeping with pasture under coconut trees for integrated farming. In this case, goat grazing areas need to be restricted to avoid damages to corn fields. While Halal industry is considered promising in Bangsamoro, the livestock sector is least developed not only in Maguindanao but Bangsamoro as a whole. Goat keeping may be strengthened as a breakthrough and the first step to establish viable Halal industry.

(3) Complete cycle processing

Complete cycle processing is a method to utilize by-products and even wastes to produce a wide range of products, while minimizing wastes. This is also in line with the idea of alternative socio-economy. From paddy, not only rice and various rice products, other products are also produced by utilizing husk, straw, bran and others. Rice straw may be processed into fertilizer or paper; rice bran into edible oil and cosmetics, and rice husk into fuel and activated carbon. A corn starch factory of Lamsan Corporation is using bio-fuel for their power generation.

This approach may be applied to coconut industry. Specifically, a coconut processing plant established probably in the municipality of Parang will benefit the local people in the Bangsamoro region from the value chain of production to processing and marketing of coconut products. Coconut coir fiber and twine production may be incorporated in the process. It is also beneficial for producers to keep costs low in the interest of market competition. As oil palm is planned to be expanded in the province, oil palm based complete cycle processing may also deserve examination.

South Upi and Upi are developing to a plantation size rubber production due to the LGU-led rubber development project. Presently rubber in Upi which was planted twenty years ago are still producing cup lumps which are delivered to a processing plant in Makilala, North Cotabato (CDP-ELA).

(4) Banana and abaca

As described above, the province has areas suitable for banana and abaca. In fact, Dole-Stanfilco, the Banana Division of Dole International, have started looking at areas in the Bangsamoro region for expansion of areas. A prerequisite may be the establishment of port facilities exclusively for banana export. While export market for Cavendish banana is still expanding particularly in Asia and Middle East, options to diversify related products are limited.

Since the soil suitability is practically the same for abaca as that for banana, expansion of abaca may be pursued in areas identified for banana. Abaca provides the strongest natural fiber and usually used for mooring ropes for ships and other specialty purposes before the invention of petroleum derived chemical fibers. Demand for abaca products particularly for twine is on the rise due to preference for environment-friendly products. Potentials for abaca products go well beyond this use, and include special purpose paper as well as textile. It is considered human friendly and environment friendly materials, and its utilization is expected to expand. Eventually, the abaca industrial cluster may be formed to produce a variety of products for export.

(5) New commercial crops

New commercial crops may be introduced or strengthened to diversify the agro-based economy and expand the resource base for agro-processing. Candidates may include calamansi, lemongrass, and vegetables such as okra, eggplant, squash and possibly other exotic vegetables for export. The latter

may be cultivated in home gardens. Cotabato Sugar Central Company started sugarcane production in Talayan. The cultivation area is planned to be expanded from the initial 500 ha to 3,500 ha. Unifrutti intends also to plant pineapple, bananas and coffee in the areas of Buldon, Barira and Matanog.

(6) Inland and coastal fishery

Inland fishery in the Buluan Lake producing tilapia and milkfish may be strengthened to include deboning and value added products for both. Aquaculture may also be promoted possibly in combination with crop cultivation for another form of integrated farming. Coastal fishery should be promoted by providing related facilities such as fishery port with cold storage. A prerequisite is the provision of stable power supply. Candidate site is the Linao Bay, where the facilities may be shared with the neighboring province of Sultan Kudarat. The fish port for Datu Blah Sinsuat is also important considering that they are engaged in tuna fishing.

(7) Water resources development and management

Water resources development and management hold a key for sustainable development of Maguindanao. Since the upper catchment areas of the Rio Grande and its tributaries are outside the provincial territory, effective measures will have to be taken within the province. Productive reforestation should be undertaken on lower mountain slopes particularly in the southwestern part of the province. Not only tree crops but combination of tree crops and shade crops such as coffee and cacao may be considered.

Use of the marsh areas along the lower reaches of the Rio Grande should be examined. This involves the delineation of the Ligawansan marsh to be protected by all means, the areas to be used for crop cultivation and possibly other economic activities such as tourism for bird watching, and drainage works necessary to allow the economic activities. Excavation of river beds and dredging may also be involved.

(8) Polloc port and hinterland development

It seems certain that the Polloc port will serve as the regional port for Bangsamoro due to its location and favorable conditions with the natural harbor and water depth. For this purpose, however, facilities need to be much improved in and around the port area. They include establishment of piers with gantry cranes, provision of cargo handling spaces, re-establishment of warehouses, and expansion of container yard. The existing terminal building may be sufficient for the foreseeable future to provide customs and other services, but ICT based port services will have to be introduced in due time.

As the regional port of Bangsamoro, the Polloc port will serve for international trade with neighboring countries and inter-regional trade including transshipment as well as local trade and functions as the main fishery port. The port hinterland is expected to be developed into a free trade zone for export oriented industries and services. An industrial estate may also be located to accommodate indigenous industries linked to export industries.

Box: Brief history of Maguindanao

The Province of Maguindanao is once part of the empire Province of Cotabato. When there were still less emigrants from Luzon and Visayas, this empire was inhabited by Bangsamoro People and known as the Moro Province. In 1967, by virtue of Congressional Act, the empire Province of Cotabato was divided into two provinces, Cotabato and South Cotabato.

The late President Ferdinand Edralin Marcos through Presidential decree 341 on November 22, 1973 again divided the Province of Cotabato into three provinces. Thus, the Province of Maguindanao, North Cotabato and Sultan Kudarat came into existence.

The newly separated Maguindanao Province was administered by Governor Atty. Simeon A. Datumanong, followed by Atty. Zacaria A. Candao. On April 1, 1977, Atty. Candao resigned and President Marcos appointed Mayor Datu Sanggacala M. Baraguir of Sultan Kudarat Municipality as Governor. In his capacity as Governor of Maguindanao, he transferred the seat of the province from Maganoy now Shariff Aguak to Sultan Kudarat Municipality as embodied in the Presidential Decree No. 1170 dated July 7, 1977. The fourth appointed governor of Maguindanao was Atty. Sandiale A. Sambolawan. On January 1980 elections, he

won as the first elected provincial governor. He returned the seat of the Provincial Government to Shariff Aguak (formerly Maganoy).

In 1986, a great historical event transpired in Manila. President Marcos was forced to leave the country through EDSA Revolution. Ms. Corazon C. Aquino was installed as the new President of the Republic of the Philippines. Upon assumption to office, she appointed Atty. Zacaria A. Candao as governor of Maguindanao on April 5, 1986 and concurrent Chairman of Lupong Tagapagpaganap Pampook (LTP). Governor Candao was elected as Governor in 1989 election.

When the Autonomous Region in Muslim Mindanao was created by virtue of Republic Act No. 6734, Governor Candao resigned and won for the position of Regional Governor of the ARMM. He was succeeded by his then Vice Governor Norodin A. Matalam as governor of Maguindanao. Governor Matalam was elected as governor in 1992 election. In 1995 election, Atty. Zacaria A. Candao won the governorship. He was re-elected in May 1998 election.

In the May 14, 2001 elections, Datu Andal S. Ampatuan, Sr. won and was the fifth elected governor of Maguindanao. Under his administration the development thrust of the Province anchored on food security, health, infrastructure and peace and resigned in 2008 and was succeeded by his son, then Vice – Governor Datu Sajid Islam U. Ampatuan. In connection with the so-called Maguindanao Massacre on November 23, 2009, the Governorship of Maguindanao was vacated by Governor Ampatuan. On December 21, 2009, the Department of Interior and Local Government issued a Memorandum Order appointing Hon. Bai Nariman A. Ambolodto as Vice Governor and at the same time acted as the Provincial Governor of Maguindanao, ended her term as Acting Governor on February 22, 2010.

On February 23, 2010, the Regional Governor Ansaruddin A. Adiong appointed Datu Gani O. Biruar as Governor of Maguindanao. He Turn-Over the Governorship of Maguindanao to Governor Elect Esmael G. Mangudadatu on June 30, 2010.

On July 01, 2010, Hon. Esmael G. Mangudadatu assumed his post as the 6th elected Governor of the Province of Maguindanao. Under his administration, the development thrusts guided by his eight (8) point development agenda, such as; Restoration of Peace and Order, Transparent, Accountable and Participative Governance, Poverty Reduction Program, Infrastructure Development, Parallel Support to Madaris and Secular Education, Accessible Quality Health Services, Environment Management Program and Revenue Generation.

Political subdivision

The Province of Maguindanao is divided into two congressional districts: the first and the second district. The first district is composed of 11 municipalities namely; Barira, Buldon, Datu Blah Sinsuat, Datu Odin Sinsuat, Kabuntalan, Matanog, North Kabuntalan, Parang, Sultan Kudarat, Sultan Mastura and Upi. While the second district is composed of 25 municipalities namely; Ampatuan, Buluan, Datu Abdullah Sangki, Datu Anggal Midtimbang, Datu Hoffer Ampatuan, Datu Montawal, Datu Paglas, Datu Piang, Datu Salibo, Datu Saudi U. Ampatuan, Datu Unsay, Gen. S. K. Pendatun, Guindulungan, Mamasapano, Mangudadatu, Pagalungan, Paglat, Pandag, Rajah Buayan, Shariff Aguak, Shariff Saydona Mustapaha, South Upi, Sultan Sa Barongis, Talitay and Talayan.

The 36 municipalities were composed of 508 barangays. Sultan Kudarat has still the most number of barangays with 39 followed by Datu Odin Sinsuat municipality with 34 and the lowest are Buluan and Datu Anggal municipalities with seven barangays each.

A.2 Lanao del Sur

A.2.1 Existing conditions

(1) Location, land and water resources

The province of Lanao del Sur is located at a latitude of 7°24’34” and nestled in the hinterland of Mindanao at an average elevation of 702 m above sea level. It occupies the extensive plateau of North Central Mindanao including the basin of Lake Lanao, the largest lake in Mindanao. The province has a total land area of 3,850.3 km^2, including the City of Marawi, accounting for 3.7% of the total land area of Mindanao and 1.8% of the total land area of the Country based on the ARMM Regional Development Plan Midterm Update (2013–2016).

Forest cover forms a total area of 1,258.2 km^2 of the province which includes production forest, protected forest, and non-forest (agriculture). The A&D land has a total area of 1,502.5 km^2, which encompasses production areas, protected areas, and built-up areas according to on the Provincial Development and Physical Framework Plan (2014-2020).

According to the Socio-economic Profile (SEP) of the province, 478.6 km^2 of the forest land area is classified as production forest. These production forest areas are located in the municipalities of Tagoloan, Wao, and portions of Bubong, Kapai, and Bumbaran. Through the Family Approach Contract Reforestation Program of DENR of Lanao del Sur, a total of 10.35 km^2 of land has been reforested. Within the forest land, a total area of 66.2 km^2 is classified as non-forest or agricultural land. These non-forest or agricultural land areas are mostly located along the watershed protected areas.

The production areas within A&D land constitute a total of 843.9 km^2 which are divided according to the type of crops planted into 192.6 km^2 for seasonal crops, 507.4 km^2 for annual crops and 5.77 km^2 for perennial crops and fruit bearing trees. The protected areas within A&D land include 117.8 km^2 of irrigable land cultivated for rice production according to the Comprehensive Development Plan Executive Legislative Agenda (2013–2016) of the province.

The remaining land uses as built up areas, as per NAMRIA survey in the province constitute a total of 2.75 km^2. However, this has to be verified since the survey was conducted quite a long time ago.

The province has a total of 387.3 km^2 of water area composed of useful lakes, rivers and swamps. There are eight lakes in the province with a total area of 376.8 km^2. Lake Lanao has the largest area of 354.6 km^2. It serves as a source of electric power generation that supplies electricity not only in the province of Lanao del Sur but also throughout the Mindanao mainland. Water in the lake is used also for irrigation in the Basak area, domestic uses such as for washing, drinking water, cooking and bathing, and livelihood such as fishing and public water transportation.

(2) Demography

The total population of Lanao del Sur as of May 1, 2010 was 933,260 based on the 2010 Census of Population and Housing. The 2010 population is higher by 133,098 compared to the 2000 population of 800,162, representing the annual average population increase at 1.55%. Marawi City, the provincial capital, was the most populous area with a population size making up 20% of the provincial total population followed by the municipalities of Wao with 4.3%, and Malabang with 4.1%. The rest of the municipalities contributed less than 3.0% each.

Of the total population in 2010, female accounted for 51.4% while males comprised 48.6%, making a sex ratio of 95, which is similar to the sex ratio in 2000. The voting age population (18 years and over) was 48.8% of the household population of the province in 2010, decreased from 49.2% in 2000. There were more female than male among the voting age population as well. The young dependents (0 to 14 years) accounted for 44.0% of the household population while old dependents (65 years and over) comprised of 1.6%, and the working age population (15 to 64 years) accounted for the remaining 54.4%.

Out of the household population 10 years and over, 50.2% were never married while 45.0% were married, the rest were categorized as widowed (2.9%), divorced/separated (1.4%), and in common-law/live-in marital arrangement (0.1%). As to marital status, there were more female than male in all categories: single (51.6%), married (50.1%), widowed (73.0%), divorced/separated (62.5%), and in common-law/live-in marital arrangement (53.8%).

Of the household population aged 5 and above, 35.9% had attended or completed only elementary education, 23.3% had reached or finished high school, 10.0% were college undergraduates, and 6.7% were academic degree holders. Female outnumbered male when it comes to academic degree with 59.6% compared to 40.4%, and similarly more female (53.4%) than male (46.6%) had pursued post baccalaureate courses.

Of the 797,065 household population 5 years and above, 4.1% (32,773 persons) had at least one type of functional difficulty either in seeing, hearing, walking or climbing steps, remembering or concentrating, self-caring (bathing or dressing), or communicating. There were more male (50.8%) than female

(49.2%) among those persons with at least one type of functional difficulty (Philippine Statistics Authority, 2010 Census of Population & Housing published in July 2013).

Overseas workers from Lanao del Sur were accounted for 1.3% (8,157 persons) of the 650,576 household population 10 years and above. Male (53.1%) overseas workers outnumbered their female (46.9%) of all overseas workers from this province.

The number of households in 2010 was recorded at 143,786, higher by 26,351 households compared with the 117,435 households in 2000. The average household size in 2010 was 6.5 persons, reduced from 6.8 persons in 2000.

In 2010, a total of 118,859 occupied housing units were recorded in the province, rendering to a ratio 7.8 persons per occupied housing unit. Out of the 143,786 households, 81.5% lived in lots that they owned/amortized, and 11.2% of the households occupied lots which were rent-free but with consent of the owner, and 2.5% rented the lots they occupied, while 1.1% occupied lots which were rent-free but without consent of the owner.

According to the Department of Health Central Office, Mindanao Health Development Office and Department of Health Regional Field Offices data, there were 20,879 live births registered as of 2011 with a crude birth rate (CBR) of 28.7 per 1,000 population. The province had a total of 1,907 deaths in 2011 with crude death rate (CDR) of 3.1 per 1,000 population and in the same year, Lanao del Sur had a maternal mortality rate of 3.28 per 1,000 population.

(3) Social services

The province has a total of 13 hospitals, of which six are government owned. The Unayan district hospital has the highest hospital utilization rate at 81% while the Balindong district hospital recorded at 37%. A total of 63 barangay health stations (BHS) and 26 rural health units (RHUs) cover the entire province. There are municipalities without health centers wherein personnel are stationed in waiting sheds to do their routine services like immunization, and consultations. Due to inadequate number of health facilities, the Helen Keller International (HKI) has recognized the need to have alternative means of adding more structures.

Lanao del Sur is divided into two congressional districts, District I and District II. These districts are subdivided further into two school divisions. The pupil-to-teacher ratio at the elementary level is 49.7 in Lanao del Sur I-A, 43.3in Lanao del Sur I-B, 37.0 in Lanao del Sur II-A, 44.2 in Lanao del Sur II-B, and 53.8 in Marawi City with an average pupil-to-teacher ratio of 45.6 for the entire province. For the secondary level, the average pupil-to-teacher ratio was 56.4 for the school year 2011-2012 based on RPDO. This is far from the ideal 1 teacher is to 35 pupils ratio (1:35).

The province had an average pupil-to-classroom ratio of 63.2 at the elementary level, while at secondary level it had an average pupil-to-classroom ratio of 99.3 which is too high by the Philippine standards.

In 2009, about 20% of the households lived in informal settlements under makeshift houses. The 2009 data indicate that 78% and 75% of the total households have access to potable water and sanitary facilities, respectively.

(4) Economy

The population density of Lanao del Sur was 240/km^2 in 2010 based on NSO. The most densely populated area in Lanao del Sur is District I particularly in Marawi City with a density of 2,100/km^2, which is the economic and administrative center of the province. It is followed by the municipality of Saguiaran with 440/km^2. The municipalities of Masiu and Tamparan on the eastern coast of Lake Lanao have the next highest density with 150/km^2 and 130/km^2, respectively.

For District II, the most densely populated area is found in the municipality of Malabang on the Lalabugan Bay coast with a density of 200/km^2, followed by Lumbaca Unayan (150/km^2) and Tugaya (140/km^2).

Of the ARMM registered 248,528 farms for agricultural use covering 533,410 ha, Lanao del Sur ranked second with 64,813 farms, covering 140,111 ha. The province's major products are palay (rice), corn,

cassava, and abaca. Palay production in the province has increased by 8.84% from 2011 to 2012 reaching a total of 186,680 ton. Lanao del Sur has a larger share in the production of white corn with a total of 223,782 ton in 2012 and produced also 45,676 ton of yellow corn in the same year. The province had a total of 485,744.7 ton cassava production in 2011. Matling Industrial and Commercial Corporation in the province is one of the top producers of cassava starch, and the products are shipped to Cebu and Manila. The province had a major share in the production of abaca in 2012 amounting to 1,625.3 ton. Other crops produced in the province include coconut (175,153.5 ton), rubber (493.5 ton) with an area harvested of 79 ha, and high value crops such as banana, coffee, mango, lansones, mangosteen, and mandarin.

Vegetables in the province are not so abundant even as the soil type is suitable to almost any kind of crops. Vegetable supplies to the province came from the City of Iligan since vegetables grown in the province could not be preserved for a day or slightly longer because of the large moisture content. There is an urgent need to introduce agricultural technologies that can upgrade the quality of vegetables produced in the province. The province had a total of 2,942.6 ton vegetable production in 2004 (CDP-ELA).

Livestock production in the province decreased drastically from 2010 to 2013 based on DAF-ARMM. In particular, carabao production by volume decreased from 4,493 ton to 2,981 ton, cattle from 5,992 ton by volume to 3,471 ton in 2013, swine from 175 ton to 124 ton, duck from 15 ton to 13 ton as well as duck egg production from 549 ton to 252 ton in 2013. Only goat production increased from 754 ton to 1,090 ton by volume from 2010 to 2013, as well as chicken and chicken egg production from 1,841 ton to 2,453 ton and 751 ton to 1,275 ton, respectively.

In the past, fishery is one of the major sources of income for the people residing along the shore of Lake Lanao. The volume of catch from the Lake was more than sufficient for the fish requirement of the populace. The suspected ecological imbalance as a result of the installation of the hydroelectric power plants of the NPC affected the breeding grounds of fishes of native species. The introduction of the carnivorous specie is another factor accelerated the extinction of fishes in the lake. Lately, the intervention of the government to remove the carnivorous *katulong* in the lake is gradually making promising results. Fishery production of the province in 2012 based on RPDO was 26,380.3 ton.

(5) Infrastructure

The total length of road networks in the province of Lanao del Sur is equivalent to 1,059.2 km based on DPWH-Province data. National roads across the different municipalities have a total length of 230.1 km, provincial roads 416.6 km, and municipal roads 412.5 km. There is no data available as to barangay roads from the province. As of 2012 based on the data of DPWH-ARMM, 15.3% of national roads and 64.87% of provincial roads are still unpaved.

Lanao del Sur has 78 existing bridges with 2.442 km combined length. The installation or rehabilitation of bridges was attributed to the increase of implementation in the Comprehensive President's Bridge Program (CPBP) and TISP for ARMM, and the PAMANA program by the National Government.

Lanao del Sur has potential irrigable area of 40,126 ha or 20% of the ARMM's total potential. The province has rate of irrigation development of 14% with a service area of 5,658 ha. If all these potential irrigable areas are irrigated with estimated average yield of 100 *cavans* per hectare with two harvests per year, the entire populace of the province of Lanao del Sur could be fed, while the surplus rice production could be supplied to other areas in the ARMM.

A.2.2 Constraints

The province of Lanao del Sur faces many hindering factors in attaining its development vision. Widespread poverty, increasing population, undeveloped physical and economic resources, and environmental degradation are among the challenges that confront the province.

Many of the people in the province are living within the poverty threshold as many households cannot provide satisfaction to basic needs. One reason of this high incidence of poverty in the province is that

for years, investment in the province had been slow even in main economic activities, speaking nothing of livelihood activities.

The relatively low population growth rate of 1.55% during 2000–10, sex ratio of 95, very low labor force coefficient, and more number of male overseas workers all indicate lack of satisfactory employment opportunities in the province. The decrease in average household size between 2000 and 2010 may also be a reflection of this situation. Another concern is that of the population over five years old, 4.1% have functional difficulties in one way or another as mentioned above.

Even at the modest population growth rate, the provincial population must have exceeded 1 million by 2015. This population magnitude would result to scarcity in resources, high demand for housing and employment opportunities including land for residential use, and increasing number of out of school youths and adults working abroad.

In the province, most forest areas in the 39 municipalities have been deforested and converted into other land uses such as settlements, agriculture and other uses. There are also areas in the province where potentials are identified for landslides, soil erosion, and volcanic eruption. Some communities in the province like Calanogas has the vulnerability to flooding incidences as well.

The slow but steady degradation of the Lake Lanao watershed is a matter of serious concern for the socio-economic development of Lanao del Sur. It tends to increase the siltation into the lake and change the distribution of runoffs into the lake, affecting the flow regulating capacity of the lake. This may reduce the hydro power potentials of the existing Agus power plants. Fishery activities in the lake may also be affected.

Lake Lanao may also be a victim to water pollution being made as coastal municipalities see it as the dumping site of their wastes, including increasing amount of non-biodegradable materials such as cellophane and excess nutrients derived from organic wastes including detergents.

The economy of the province is agriculture based and the constituents' income relies on agricultural production. However, despite this requirement, only 14% of the total irrigable areas in the province have been provided by irrigation facilities. The low irrigation development is one of the stumbling blocks in the economic growth and development of the province particularly in rural areas.

The province has a vast fertile agricultural lands and water bodies though its production is relatively low. This may be attributed to high cost of farm inputs such as fertilizers, seeds, pesticides, and others.

Other development issues that the province have are 1) inadequacy of infrastructure support facilities, 2) inadequate facilities in some government hospitals, 3) inadequate facilities/classrooms in both public tertiary and basic education schools, 4) poor conditions of farm to market roads wherein farmers were discouraged to increase their agricultural and fisheries products because of difficulty in bringing their products to the market, 5) poor access to basic services such as health, education, electricity, water, and housing; 6) poor sanitation and hygiene where many houses along lakeside still use the lake as their toilet areas at the same time using the lake as a source of water needs, 7) depleting mangrove areas which have been neglected by farmers not recognizing their importance, and 8) untapped tourism potentials wherein the province has a variety of tourist spots to be developed.

A.2.3 Prospects

(1) Soil suitability for crops

The Bureau of Soils identified 11 types of soil common in the province, of which a large portion is suitable for rice and corn. Salaman loam clay accounts for 0.52%, Ramain and Buaya-an loam clay with 0.50%, and Pu-an loam clay with 0.21%. All these are identified as good types of land suitable for agricultural uses.

The moderately good type of soil is the Binidayan silt loam which covers 11.1%, while the fairly good soil but limited for cultivation are the Adtuyo clay loam, Langkong Sandy loam and Kundarangan clay loam comprising 33.3% land. Soil types limited to pasture and forest are the Malabang sandy loam, Adtuyo-bam Castillan complex, Caromatan silt loam, Bolinao silt loam, Kidapawan clay loam and

Jansan clay loam with an aggregate percentage of 15.6%. Land with a soil type suitable for forestry is the mountain soil with 30.2%. Another soil type is the Kudarang loam clay which comprises about 30.2%.

(2) Mixed and integrated farming

Promotion of mixed and integrated farming in the province should be essential in increasing the value-added and employment opportunities as well as farmers' income. Coconut is a main source of income of the province in municipalities along the coastal areas where most plantations are concentrated. Coconut trees are also grown in the different upland municipalities of the province but only for local consumption. Corn production is also common. Mixed farming combining coconut and corn is quite natural, but other field crops may also be combined.

Livestock is least developed in the province. Considering the dominance of rolling to mountainous topography, goat keeping may be promising. Goat can be kept under coconut trees for integrated farming. Both meat production and dairy farming are promising as goat meat is considered a delicacy and goat milk is taken as healthy food in developed countries. To establish goat keeping as a major industry, it should be promoted as goat-based halal industry. Institutional supports should be provided by the Bangsamoro government including the establishment of certification system.

(3) Agro-industrial clusters

Lanao del Sur is largely a disaster-prone land, vulnerable to floods, landslides, volcanic eruptions and earthquakes. Also, protection of the Lanao Lake watershed is critically important for the development not only of the province but also of the Mindanao mainland as a whole depending on the Agus hydro power. To generate a large number of employment opportunities and value-added with minimal stress to environment, industrial clusters based on primary products would be very effective.

Two promising agro products as bases for industrial cluster development in the province are abaca and cassava. Abaca is produced at present mostly in small sale for immediate sale to traders. Abaca production in the province should be much expanded and processing facilities established starting with fiber stripping machines to produce consistent fibers of high quality. Further processing into high value products such as special purpose papers as well as handicrafts would be introduced as the production increases. Cassava processing is already undertaken in Malabang. Products may be diversified if production is increased significantly.

(4) Irrigation development

One significant input into increasing rice production in the province is through sufficient irrigation program. The province estimates that potential irrigable rice farms constitutes some 40,000 ha (Lanao del Sur 2009-14 PDPFP). When fully irrigated, these farms can easily produce some 140,000 ton of rice (3.5 t/ha), sufficient to meet current population requirement and even achieve surplus. Current irrigation facilities cover a service area of some 5,658 ha mostly located in the province lowland rice producing municipalities including, Bubong, Buadipuso-Buntong, Ditsaan-Ramain, Poona Bayabao, Lumba Bayabao, Taraka, Tamparan, Masiu and Maguing. Potentially irrigable rice farms are located in at least 19 municipalities.

Other significant input to increasing rice production are support infrastructure including post-harvest facilities and farm to market roads which are way below sufficiency level.

(5) Fish production

Fishing as an economic strategy is another area for focus. The deficiency in protein intake of the population is traceable to low fish production, both in land and sea. Several issues identified relative to depleted fish production include, among others, degradation and pollution of lakes, swamps, and rivers and illegal fishing methods. Aquaculture in lakes by using cage net or pen should be promoted under proper management and law enforcement.

(6) Environmental management

Climate change and its impact is a local as well as global concern. At the provincial level, environment-related threats include lack of effective drainage and flood control system. The geologic make-up of the province is such that Lake Lanao watershed becomes the biggest catchment area for flood water. The volume of run-off water is increasing due to forest and forest cover degradation. Rapidly diminishing forest cover caused both by natural and man-made/initiated incidents significantly aggravate the situation. Protection of the upper catchment areas of Lake Lanao is critically important for the medium to long term development of the province.

(7) Improved solid waste management

Improvement of solid waste management is another significant focus at it affects poverty alleviation, health, and disaster management. The province should be encouraged to adopt the sanitary landfill as the proper method for solid waste disposal. LGUs should strictly implement their 10-year solid waste management plan consistent with their resolutions and ordinances prepared. They should set aside sufficient funds for solid waste management activities.

Massive information campaign should be conducted through print, television and radio to raise awareness of people for proper solid waste disposal. LGUs should see to it that solid waste management is included in their priority for implementation and the management plan shall include an implementation schedule which shows that within five years sanitary landfill will be the standard disposal method. LGUs shall divert at least 25% of all solid wastes from waste disposal facilities through re-use, recycling, and composting activities and other resource recovery activities, and that the waste diversion goals shall be increased every three years thereafter. LGUs should immediately convert their open waste disposal sites to controlled dumpsites following procedures as stipulated under RA 9003, in order not to face fines and penalties.

(8) Tourism development

Tourism industry is potential for the improvement of the economy of the province not only because of the natural and man-made tourist spots but also because of the attitude and culture of the Maranaos. The Maranaos are famous for their hospitality, particularly those in rural areas which discourage the building of hotels or lodging houses. The Maranaos used to accommodate their visitors and even strangers at their own home or house. The province sets at an elevation making its climate temperate and with the heavily forested mountains surrounding it and landscape. The province as a whole can be said to be an ideal tourist destination.

A.3 Basilan

A.3.1 Existing conditions

(1) Land and location

The province of Basilan is one of the island provinces of the ARMM and is separated from the mainland of Mindanao by a strait of about 17 miles at its narrowest margin. Basilan is located across the southern tip of the Zamboanga peninsula and is bounded on the north by the Basilan strait, on the east by the Moro Gulf, on the southeast by the Celebes Sea and on the west by the Sulu Sea. Geographically, it lies between latitudes 6°16'48" and 6°45'56" N and between longitudes 121°26'00" and 122°24'38" E.

The entire province is basically devoted to agriculture. It has an aggregate land area of 3,511.7 km^2 including islets within its territorial boundary. Basilan ranks fourth in terms of land area among the ARMM provinces. The province is broadly categorized as production land use and protection land use. Production land use constitutes roughly 73% or a total of 362,448.7 ha, classified and released as A&D. The remaining 134,056.4 ha or around 27 % are either timberland or forestland.

The province is composed of two component cities, 11 municipalities and 52 islands and islets with a total of 255 barangays. Of the total municipalities, two are island communities.

The terrain of the province ranges from undulating to rolling from the coast to rolling and moderately steep towards the interior parts of the province. A portion of the area or a combined 54,574 ha has a level to nearly level with a slope of 0–8%. Around 30% of its land area or 48,476 ha have 18% slopes or undulating to rolling.

(2) Demography

According to the 2007 NSO Census of Population and Housing, the total population of the province increased to 496,505 from 332,828 in 2000. The province registered an average annual growth rate of 6.44% during the period of 2000-2007. For the component cities, Lamitan City registered an average annual growth rate of 4.73%, higher compared to Isabela City with 2.70%. Of the population of 496,505, 50.1% (248,380) are male and 49.9% (248,125) are female making a sex ratio of 101. This ratio is slightly higher than the sex ratio of 100 males per 100 females or 1:1 posted in 2000.

The number of households reached 95,362 which are 30,392 households more than the 2000 figure. The average household size in 2007 was 5.22 persons, slightly lower than the average household size of 5.43 persons recorded in 2000.

(3) Social services

The province has an existing general hospital located in Isabela City administered by the Department of Health (DoH). It has 25-bed capacity and attended by five physicians. The provincial government has one functional district hospital stationed in Lamitan City with 25-bed capacity and attended by two physicians. The other district hospital in Sumisip municipality was abandoned due to non-availability of funds. In the same manner, the Lamitan district hospital is also suffering from insufficient financial assistance and maintenance from the provincial government.

The province has 13 main health units manned by nurses and midwives. Only 98 barangays or 38% of 255 barangays have health stations (functional/non-functional) managed and overseen by midwives, health volunteers and some with nurses. Some barangays without health stations are being served by catchment areas of nearest stations.

The leading sickness for children under five recorded for the province is skin disease with the rate of 115.5 for every 100,000 population or with a total cases of 372, followed by pneumonia with 188 cases (68.35 for every 100,000 population) and bronchitis with 115 cases (35.4 for every 100,000 population). For adults, leading causes of morbidity is also skin disease with the highest incidence of 1,616 cases or around 501 for every 100,000 population, followed by pneumonia with 1,348 cases (221 for every 100,000 population), and diarrhea with 649 cases (201 for every 100,000 population).

For Infant mortality, tetanus neonatorum is the leading causes of death with 2 cases or a rate of 0.44 per 100,000 population, followed by pneumonia, CPA complication, multiple congenital anomalies, malnutrition and diarrhea with 1 case each. Pneumonia is the leading cause of death for children under five with a total case of 6 or 1.86 per 100,000 population, followed by diarrhea with 5 cases (1.55 per 100,000 population), tetanus nuenatorum and malnutrition with 2 cases each and CPA complication and multiple congenital anomalies with 1 case each.

The leading causes of death for adult is cardio vascular disease with 75 cases or 3.58 per 100,000 population, followed by gunshot with 72 cases (22.3 per 100,000 population), CPA unknown etiology with 51 cases (15.8 per 100,000 population), and vehicular incidence with 35% (10.9 per 100,000 population). The total live births recorded by the Provincial Health Office (PHO) were 4,983 and about 530 or 10.6% weighed less than 2,500 grams or under-weight.

The province of Basilan has 265 primary/elementary schools, 21 secondary schools composed of private/public schools, and seven tertiary school/colleges. Of the household population 10 years old and over, only 72.2% are literate. Literacy rate for male was 74.1% and female 70.4%. Elementary literacy rate of the province is 72.3%, while the secondary level 79.8%.

For the cohort survival, the municipalities of Tipo-Tipo, Ungkaya Pukan, and Al-Barka shared the highest rate of 87.1%, while Lantawan has the lowest cohort survival rate of 76.5%. The highest secondary drop-out rate can be noticed in the Maluso municipality with 7.15%, while Lantawan has the

lowest rate of 1.97%.

Based on the elementary school standard of classroom-to-pupils ratio of 1:40, the Basilan Schools Division needs 1,372 additional classrooms to fill in the gap. There are about 677 classrooms that need to be repaired and additional 322 new classrooms to be constructed. There are shortages of classroom seats for both elementary and high schools. The existing ratio is 1.7 students per usable seat. It is estimated 19,601 seats are needed to cover the gap requirements for the entire province.

There are 116 daycare centers existing in the whole province against the 255 barangays to be served. No data of daycare workers are available who complemented the personnel of the LGU's Social Welfare and Development Office. The management and support for daycare services are the main responsibilities of the LGUs.

The percentage of households with sanitary toilets in the community registered at 25.3% or 19,002 households against the total of 75,356 households. This low performance can be attributed to the lack of efficient information transmission and education campaigns by the LGUs health workers. Most rural/coastal households are deprived of toilets.

Around 41.3% or 32,443 households have access to safe water, and the remaining 58.7% are fetching from doubtful sources. Only the Cities of Isabela, and Lamitan (Lamitan Water District-LAMWAD), and the municipality of Maluso are being served with Level III water supply through their respective local water districts: Isabela Water District (ISAWAD) and Maluso Water District (MALUWAD). Among the three water districts, Isabela City has the lowest water rates of PhP130 for a minimum consumption of 0–10 m^3 while Lamitan City is the most expensive at PhP150.00 for the same minimum consumption.

(4) Economy

The Maluso municipality on the western coast recorded the highest population density in the province with 286/km^2 in the 2007 Census of Population. It is followed by the municipalities of Tabuan-Lasa and Tuburan with 150/km^2. The Al-Barka municipality has the lowest population density of 56/km^2. Isabela City's population density is 393/km^2, which is higher than Lamitan City's 231/km^2. It is projected that both cities will experience accelerating urban population growth. Increased immigration is expected due to the accessibility in these cities to services, businesses and other opportunities.

The poverty incidence in the province is much pronounced in rural communities than that in the urban centers. Local figures show that 89% of the total barangays indicate a high incidence of poverty. In 2006, the province was ranked 46th among all the provinces in the Country in terms of poverty incidence registered at 31.7%, lower compared to 2003 poverty incidence of 43.7%.

Based from the Philippine Poverty Statistics Data of the National Statistics and Coordinating Board (NSCB), in 2006 the Basilan province had the annual per-capita poverty threshold of PHP 13,255 or 20.7% higher than the 2003 level of PHP 10,987. The annual per-capita food threshold for the province in 2006 is around PHP 9,256 or roughly 70% of the income required to meet the food necessity of the family. The remaining amount of PHP 4,009 was allotted for the non-food requirements. On a daily basis, an averaged sized family would need about PHP 308.5 to meet its family's basic needs.

Agriculture and fishery are the foundation of the province's economy. Large proportions of those employed are engaged in farming and fishery production. Stated below are the indicative production data while other statistics are sourced out from concerned agencies.

Palay/paddy

The province has a total rice area of 1,086 ha both irrigated and rainfed/upland areas. Palay production in the Basilan province for calendar year 2005 was 1,716 ton in irrigated areas and 496 ton in the rainfed/upland areas. This makes the per-capita rice production of less than 5kg per year. In 2010, the average yield for irrigated farms was recorded at 2.5 ton/ha while for rainfed/upland areas had registered an average yield of 2.2 ton/ha.

Corn

The total area devoted to corn production in the province is 414 ha. Corns (yellow and white) are mostly planted in upland areas and usually intercropped with cassava. In 2005, approximately 588 ton of corn was produced in the province. It may be noted that farmers prefer to plant white corn than yellow corn because of market advantage.

Rubber

The province was one of the major producers of good quality rubber in the region until the advent of the Comprehensive Agrarian Reform Program in 1988 which led to the voluntary sale of large plantations to agrarian reform beneficiaries (ARBs) turned cooperative. As per indicative data, there are 9,742 small farmers in the province who had concentrated in rubber plantation. Of the total farmers, 46.4% or 4,517 are individual farmers distributed among the nine municipalities and two cities, while 53.6% or 5,225 were former workers of the large corporations in the province.

Around 15,503 ha are planted to rubber, of which 7,148 ha or 47.5% were planted by individual farmers scattered in nine municipalities and two cities while 7,905 ha are owned by members of the cooperatives of the ARBs.

Of the total rubber area, roughly 47% or 7,029.5 ha are immature, 32% or 4,880.2 ha are productive while 21% or 3,143.4 ha are less-productive. In terms of distribution of rubber farms and growers, out of 255 barangays around 53% or 135 barangays are engaged with rubber.

Coconut

The province has a total of 67,012.2 ha planted to coconut. Coconut production in the province was recorded at 55,467 ton in 2009.

Fishery

Basilan is surrounded by rich fishing grounds such as the Basilan strait, Moro Gulf, Sulu Sea and Celebes Sea. Fish caught were bariles, alumahan, matang baka, dalagang bukid, tangingue, dilis, talakitok, lapu-lapu and labahita, among others.

There are about 700 commercial fishermen, 10,000 full time and 17,000 part time municipal fishermen. Overall, about 12% of the total working age population is involved in fishing. In 2008, the province produced a total of 730 ton of fish and 6,062 ton of seaweeds.

Livestock and poultry

Livestock and poultry industry remained entirely at the backyard level with chicken production reaching 361,457 heads in 2009. Cattle and carabao was recorded at 42,852 heads, while goat production had reached 26,029 heads. The total number of hogs was recorded at 34,861 heads. Ducks, horses, and turkey with 13,288 heads are also kept.

(5) Infrastructure

The provincial circumferential road network provides the main access to all the municipalities and cities in the province. The national road network has a total length of 156.7 km, of which 81.6 km or 52% are paved and 75.1 km or 48% are still unpaved. Of the Basilan national roads, 132.9 km or 85% constitutes the Basilan circumferential road. As of January 2015, the circumferential road is now 100% concreted.

The roads under the jurisdiction of the provincial government have a total length of 236.3 km, of which 4.01 km or 1.52% is paved and 259.3 km or 98.5% remains unpaved. Some sections are already dilapidated and impassable during rainy days.

Mode of transportation in reaching the island province of Basilan can either be by sea and air. There are three shipping companies traversing Zamboanga City to Isabela City (vice-versa) and Zamboanga City to Lamitan City (vice-versa). Both wharves of the twin cities are catering passengers and cargoes by ferry, fast craft and RoRo boats.

The province of Basilan has three entry ports namely, Isabela City, Lamitan City and Maluso wharves. Isabela and Lamitan ports cater to passengers/cargo vessels and RoRo boats. Agricultural products and other commodities are being shipped through these ports. Roughly, estimated data show that 60% of outbound and inbound goods is routed through Isabela City, while around 40% is shared by Lamitan City port.

Travelling to nearby cities and municipalities are by shuttle vans and mini-buses that ply from Isabela City to Lamitan City and Maluso. Several jeeps, trucks and motorcycles can also be hired. Almost all poblacions are using pedi-cabs, tricycles and mini-cabs.

The municipality of Maluso which is the capital of fishing industry in the province mainly benefited in terms of marine-products landing in volume and commodities from Sulu and Sabah, Malaysia.

A.3.2 Constraints

Lack of reliable and adequate data presents a fundamental constraint to the provincial development in all the aspects. It poses difficulties in development planning, programming and budgeting. This tends to result in low performance of public and private investments. It may even affect peace and order conditions in the province by making proper law enforcement and monitoring difficult.

The province suffers from low levels of basic services. Health services face a range of problems including lack of assistance to district hospitals, and shortages of health workforce, facilities and equipment, and medical supplies. At the root of these and other problems may be the Local Health Board not functioning properly. Consequently, the province suffers, among others, from high percentage of malnutrition and high incidences of preventable diseases.

In the education sector, participation rates are low in both elementary and secondary schools. The province faces serious shortages of classrooms at the elementary level. Literacy rates are low in most municipalities. Functionality of the Local Education Board needs to be improved as well.

Quality of infrastructure in the province is generally low except the Basilan circumferential road. Power supply is insufficient. Water supply in the province is largely inadequate, contributing to high rates of waterborne diseases. Sanitation facilities are also inadequate including toilets and sewerage systems.

While agriculture is the mainstay of the provincial economy, crop cultivation is not much diversified with paddy, corn, and coconut being main crops. Rubber is produced widely, but only primary processing is undertaken in the province. Livestock and poultry are undertaken only at the backyard level. Despite large fishing grounds, only about 12% of the working age population engage in fishery, including part time fisher folks. Employment rates are quite low in the province. Moreover, supports by LGUs for agriculture and fishery are largely lacking.

Basilan as an island province of volcanic origin is vulnerable to various natural disasters. Preparedness to disasters, however, seems to be almost totally lacking in the province. A provincial disaster risk reduction and management (DRRM) plan has not been prepared. This will make it difficult for the province to cope with effects of climatic changes among others. The province has no forest area land use plan, allowing the degradation of watershed areas. No coastal resources management plan has been prepared, and naturally no marine protection areas have been designated.

With the high population growth rates in recent years in the two cities and some municipalities, all these problems will be aggravated. A range of problems related to urbanization will become particularly serious including solid waste management and water pollution.

A.3.3 Prospects

Of the three island provinces, Basilan is most easily developed as it has a sizeable main island closest to the mainland with smaller number of small islands closer to the main island. Agricultural and fishery products can be easily transported and marketed in the mainland. To boost the provincial economy, agriculture should be diversified with crop diversification in favor of commercial crops such as cacao, oil palm and abaca, and mixed farming with livestock and poultry. Goat keeping may be promising

considering the undulating to rolling terrains.

Rubber industrial cluster may be established to produce a range of products including rubber footwear and rubber gloves for various purposes. Old rubber trees may be used for woodworks. For the success of the industrial cluster, some products should be produced for export market. Therefore, as the cluster is formed, additional raw materials should be brought from the mainland in the form of latex to produce tires or other export goods.

Abaca expansion may provide additional raw materials for the abaca industrial cluster to be established in the mainland. Cacao and palm oil will also be supplied to processing plants to be established in the mainland.

Fishery production should be much expanded. In addition to open sea fishery in the productive fishing grounds in and around the province, marine aquaculture should be strengthened. Promising products include lobster, crab, seaweed and abalone. Ice plants and cold storage should be provided to support the fishery development.

To promote these activities in coastal and inland municipalities, the road network should be much improved by strengthening links with the existing Basilan circumferential road network. To improve water supply, all the conceivable water sources should be tapped including springs, small lakes and groundwater in upland areas. Power supply should be expanded by developing alternative energies as much as possible including solar, mini hydro, wind and ocean energy. Falls may be utilized for small hydro power generation. Geothermal energy may also be explored. Use of ocean energy should be experimented first.

Tourism has high potentials and will be developed once peace and order situations are improved. To safeguard this option for the future, environmental management should be properly established involving all the stakeholders from the provincial government and LGUs to farmers and fisher folks. As part of it, the forest land use plan and the marine resources management plan should be prepared by participatory approach to raise awareness of local people and administrators.

A.4 Sulu

A.4.1 Existing conditions

(1) Land and location

The province of Sulu is located in the southern part of the Philippines and lies approximately between latitudes 5°25' and 6°30' N and between longitudes 119°35' and 122°0' E, bounded by the Sulu Sea on the north and the Celebes Sea on the east.

Based on the NAMRIA data, Sulu has a total land area of 1,673.8 km^2. It accounts for 13% of the total land area of the ARMM. Sulu's total land area is classified into A&D land accounting for 476.9 km^2 or 29.8%, 482.1 km^2 or 28.8% agricultural land, and the remaining 662.8 km^2 or 41.4% unclassified public forest.

Sulu is predominantly an agriculture area planted with a variety of agricultural products. Out of the total land area of 167,376 ha, 94,500 ha (56%) comprises the agricultural land according to the DA data. The major agricultural crops in Sulu are coconut, cassava, abaca, coffee, banana, mango and exotic fruits like durian, lanzones, mangosteen, etc. Rice and vegetables are also produced in the province. Intercropping and multi-cropping are commonly practiced especially in coco-based farms.

(2) Demography

Based on the 2010 Census of Population and Housing (CPH), the province of Sulu posted a total population of 718,290 persons as of May 1, 2010. This is larger by 98,622 persons compared to its total population of 619,668 persons counted in the 2000 CPH. The increase in the population count from 2000 to 2010 translates to an average annual population growth rate of 1.49%. This is lower than the average 2.80% between the census years 1990 and 2000. The province's population density increased

from 370.2/km² in 2000 to 530.1/km² in 2013.

In 2010, the median age of the population of the province was 19.1 years, which means that half of the population was younger than 19.1 years. This is lower than the median age of 19.4 years that was recorded in 2000. In 2010, the young dependents (0 to 14 years) comprised 39.7% of the household population while the old dependents (65 years and over) posted a share of 1.5%. The working-age population (15 to 64 years) accounted for the remaining 58.8%, which is low compared to most other regions.

The number of households in 2010 was recorded at 122,001, higher by 23,850 households compared with 98,151 households posted in 2000. The average household size in 2010 was 5.9 persons, reduced from the average household size of 6.3 persons in 2000.

According to the MHDO statistics, the crude birth rate in Sulu in 2011, is 11.1 per 1,000 population or 9,266, while crude death rate is 466 or 0.6 per 1,000 population. Maternal mortality rate is 1.40 per 1,000 births.

Of the 718,277 household population in 2010, female accounted for 51.0%, while male comprised 49.0%. These figures resulted in a sex ratio of 96. In 2000, the sex ratio recorded was the same as that in 2010.

Of the 536,771 household population 10 years old and over in Sulu, 1.3% (or 7,009 persons) were overseas workers. Female overseas workers outnumbered their male counterparts as they comprised 56.1% of all the overseas workers from this province. Overseas workers in the younger age groups (below 20 years) made up the largest age group, comprising 20.9% of the total overseas workers from this province in 2010, followed by the age groups 25 to 29 years (17.5%), 20 to 24 years (15.1%), and 45 years and over (14.9%).

Though no statistics on outmigration were available, the magnitude could be significant considering the peace and order situation and the limited opportunities for economic and professional growth.

(3) Social services

Sulu has 410 barangays, of which only 43 barangays, 10.4% of all the barangays, have health stations. According to the IPHO-Sulu 2006 statistics, there are only 11 government physicians, 22 nurses, seven dentists, and 59 midwives. The province has six hospitals, 23 rural health units as well, but no tertiary hospital exists.

Sulu has the lowest literacy rate of 61.7%. For the school year 2006-2007 only 93,415 enrolled for the elementary level; 21,078 for the secondary or high school level; and, 5,212 for the tertiary level or college level. There are 392 public and private elementary schools, 40 public and private secondary schools, and 6 colleges.

In terms of achievements, the participation rate or the proportion of all grade level children who enrolled against the estimated 6–12-year old population improved from 80.2% (SY 2004–2005) to 85% (SY 2006–2007). The cohort-survival rate or the proportion of Grade VI pupils who graduated to Grade I pupils who enrolled 5 years ago improved from 43% (SY 2004–2005) to 49.74% (SY 2006–2007). These are data from the Department of Education Division I and II covering the school year 2005–2006.

Presently, Jolo town and some barangays of municipalities of Patikul and Indanan have accessed to Level III water systems served by the Jolo Mainland Water District. The 2000 census showed that about 26% households are served by the water system where 14% of which are Level III and 12% from Level II (faucets shared with other households). Of the households in Sulu, 29% drew water from dug wells for drinking and/or cooking.

In terms of toilet facilities, the 2000 census data reveal that 38% use the open pit type, 17% use water-sealed sewer/septic tanks, and 13% is of closed-pits. The households that used other kinds of toilet facilities comprised 18%, while about 14% had no toilet facility at all.

(4) Economy

Sulu is predominantly an agriculture area planted with a variety of agricultural products. Out of the total land area of 167,376 ha, 94,500 ha (56%) comprises the agricultural land according to the DA data. Coconut trees cover 64,360 ha, cassava 2,257.5 ha, abaca 3,333 ha, coffee 2,423.8 ha, rice 1,007 ha, corn 736.4 ha, fruit trees 6,354.5 ha, vegetables 271.5 ha, and other crops 7,288 ha.

Livestock and poultry production remained entirely at backyard levels. As of 2006, cattle (67,193 heads) and goat (62,665 heads) have the highest population of livestock raised. Goats are raised in all municipalities of the Muslim-dominated province for use in religious rites (kurban) during Hariraya Eid'l Adha and other occasions. The most number of carabaos are found in the municipalities of Luuk (667 heads), Kalinggalan Caluang (216 heads), and Siasi (209). Horses are used as a means of transportation in the municipalities of Talipao (2,323 heads), Kalinggalan Caluang (1,937 heads) and Pangutaran (1,169 heads). They also ferry the agri-products from one barangay to another.

The most common poultry raised in the province are chicken (455,501 heads) and ducks (26,482 heads).

Out of the 18 municipalities in Sulu, eight are island municipalities and 10 are in the main island. It has several islands and islets, shoals, atolls and cow-beds. As reported by the University of the Philipines, Marine Science Research Center, Philippine coral reef areas covered a total of 44,095 km^2, of which 25% (12,263.2 km^2) are found in the Sulu Archipelago.

Sulu has four major fishing grounds: Dual Bullod, Teomabal, Sulare and Selum. It also has the Sulu Sea, Moro Gulf and the untapped 200 miles Exclusive Economic Zone (EEZ). With its vast potential fishing area, purse seiners from Luzon and Visayas kept on poaching the Sulu Sea, which affects the volume of fish catch of marginal fisher folks. There are also two sites of fish sanctuaries and marine protected areas found in Lahat-Lahat, Cabucan (Panglima Tahil) and Tara Island (Siasi).

Sulu continues to be predominantly agri-fishery based economy and two-thirds of the population are directly or indirectly dependent on fishing as their source of livelihood. The total fish catch in 2006 amounted to 35,843.6 ton.

In Sulu, the seaweeds industry is considered as one of the major industries that benefit the majority of the coastal fisher folks. Two of the potential seaweed species being cultured in the seaweed farms are the Eucheuma and the Cappiphycus spp. Of the total coastal water in Sulu, 90% is suitable for seaweed culture. Sulu contributes 40% of the export on carrageenan, one of the world's foremost food and industrial additives today. In 2006, the total seaweed production reached 46,841 ton.

(5) Infrastructure

As of 2006, the Department of Public Works and Highways in Sulu reported a total road network of 1,030.6 km. The roads consisted of barangay roads (608.1 km or 59 % of the total), 267.1 km (26%) provincial roads, 135.93 km (13%) national roads and 19.5 km (2%) municipal roads. Roads were mostly of gravel and earth type. Concrete paved roads cover 138.0 km, asphalted 34.64 km, earth 411.4 km, and gravel 446.6 km.

Air transportation in Sulu provides the fastest means of mobility for people, goods and services. The Jolo airport is the only airport located in the capital town of Jolo. The runway is paved with asphalt and the airport is classified as a secondary airport. It has a length and width of 1,200 and 20 m respectively with a load capacity of approximately 13,609 kg. Presently, the airport's runway and terminal building are deteriorating and need to be rehabilitated and improved. Only the Philippine Airlines has operations in Jolo.

Sea transportation provides the major access to the province as it remains to be the cheapest means of transporting goods and people from the province to other major cities (i.e., Zamboanga City) and other island provinces. Sulu has three major seaports located in Jolo, Maimbung and Siasi. The Jolo seaport has a reinforced concrete wharf with an available berthing space of 330 m and a backup area of 1,640 m^2.

Low agricultural production could be attributed partly to the inadequacy of irrigation facilities in municipalities. There are five units of Small Water Impounding Project (SWIP) in the municipalities

of Indanan (Buansa), Luuk (Kanmindus & Kanmuni), Patikul (Kaunayan), and Talipao (Lungkiaban), constructed by DA-RFU-IX. Most of them are still functional but the service canal needs to be rehabilitated to have a good flow of water from the source to the rice area. Other communal irrigation projects (CIPs) were also constructed by NIA in some municipalities but others are non-functional. The rehabilitation/upgrading of these irrigation facilities could service an additional irrigated area which can produce an increased yield of palay and other crops.

A.4.2 Constraints

(1) High poverty incidence due to limited employment opportunities

According to the National Statistical Coordination Board (NSCB) data, the poverty incidence of Sulu was 45.1% in 2003. Addressing poverty requires addressing issues such as those relating to: low income and employment, or the need to stimulate the local economy and to create jobs and increase markets for local agriculture and fishery products. The poor sector in Sulu consists of the marginal farmers and fishermen and the seaweeds growers.

Sulu suffers from insufficient employment opportunities particularly for youth. This situation shows in the low labor force coefficient, sex ratio smaller than 100, and sizeable overseas workers particularly of youth. Decrease in average household size during 2000–10 may also be a reflection of job seeking outmigration.

(2) Unstable peace and order situation

Another major issues or concern in the province is the unstable peace and order situation. Armed groups like the Abu Sayyaf and lawless elements continue to clash sporadically with government forces. This situation has also resulted to the lack of investments in the province. This has also caused displacement of families and thus resulted in unnecessary movement of population from one area to another or from one municipality to another. In many ways, the unstable peace and order resulting to the bad perception of the province as war-torn area dampens initiatives for economic endeavors and social amelioration programs.

(3) Limited access to basic social facilities and services and low service efficiency

The limited access and efficiency in the delivery of basic social facilities and services constitute the third major problem in the province. Difficulties in reaching mountainous terrain and scattered islands as well as unstable peace and order conditions aggravate the situation. The province has low coverage of barangays by health stations, and small number of health personnel. The lack of health personnel especially in far-flung areas contributed to the high mortality and morbidity rates in Sulu.

The province has the lowest literacy rate (61.7% in 2006–07), although education performance is improving in recent years with respect to enrollment rates and survival rates. The low literacy rate is brought about by the intervention of so many factors detrimental to development. First to consider is the inefficient workforce. About 30% of the teaching force fielded in schools is provisional teachers, those who have not passed the licensure examination given by the Professional Regulations Commission. These teachers are only granted five years to teach through the issuance of the Special Permit to Teach. In short, these teachers are not qualified to teach as they failed in the LET but because of shortages of teachers due to increased enrolment, the Division Office has no choice but to hire them. Government allocation of resources such as textbooks, other instructional materials, school buildings, equipment and furniture are not commensurate to the number of pupils enrolled.

For water supply and sanitation, 29% relies on dug wells, 38% use open pit latrines and 14% has no toilet. Many barangays in Sulu do not have daycare centers. Therefore, facilities and workforce complement for health, education and social welfare services are also wanting in quantity and quality.

(4) Inadequacy of physical infrastructure support facilities

The lack of adequate physical infrastructure support facilities in the province has been a major stumbling block to spur economic growth and development. The cost of electricity is relatively high. Further,

only 59% of the barangays are energized. Although, Sulu has many water sources, many of them are undeveloped resulting in the low access to potable water.

Coverage by basic services is difficult as 10 out of 18 municipalities are on small islands. Three ports exist in Sulu, but two of them are in the main island, and only one port exists on the Siasi Island. The Jolo airport is the only airport in the entire province. The total road length of 1,031 km represents a road density of 0.62 km/km^2, which is far from ideal. Moreover pavement conditions of roads are inadequate except the national roads.

(5) Improper collection and disposal of solid/liquid wastes

The remarkable upsurge in population growth in the central town of Jolo and partly in the adjacent municipalities of Indanan and Patikul brought about by the trade and commerce coupled by the unstable peace and order situation around its neighboring municipalities had invariably resulted to serious impact on its present environment. One of the by-products that population growth and urbanization has brought to these areas is the increase in the volume of solid wastes generated by its general community. Unfortunately, most, if not all, solid wastes generated end up being disposed along streets, canals, vacant lots, rivers and seas, or brought to the temporary open dumpsites at Patikul and Indanan. These current practices are causing significant threats to the deteriorating environmental quality of the town of Jolo and the three adjoining municipalities.

(6) Frequent flooding in the capital town of Jolo

Drainage and flood control have become a perennial problem in the capital town of Jolo. At the slightest onset of rain, the flood prone areas and its main thoroughfares are impassable, detrimental to the deliveries of goods and services, affecting businesses and the commuters alike.

(7) Proliferation of unplanned, informal and overcrowded settlements

Migration from the neighboring municipalities had led to the congestion of the town of Jolo. This had apparently resulted because the town of Jolo is more urbanized compared to other municipalities of the province being the center of trade and commerce, center for education and undoubtedly where job opportunities are primarily available. With the limited area of Jolo, this influx of people concentrates in the coastal barangays where they could easily build their new homes. Others dwell along sidewalks, canals, swamps, government sites and reservations.

(8) Proliferation of economic activities in protected areas

As an effect to the ever increasing population and the profound human activities, the protected areas had apparently lost its worth and value. These areas have been tremendously degraded as they are subjected to abuses by some local folks for economic reasons. The teak reserves in Patikul and Panamao are dwindling. Encroachment in the national park at Bud Daho, Patikul is likewise noted.

Notwithstanding its defined boundaries, some people especially the adjoining land claimants and their tenants take advantage of the area and get whatever they may benefit thereon for economic use and purpose. The provincial park at Bud Datu, Tagbak, Indanan, Sulu is now being used as a military camp for security purposes since the area is strategic for such use. It deprives the province the opportunity of developing it for eco-tourism purposes in combination with the famous Rajah Baginda shrine.

The mangrove resources are in the midst of depletion. People ravaged these areas for livelihood purposes without control, where they can cut and collect these for firewood and other uses. The coral reefs which serve as sanctuary for fishes and other marine life have been depleted because of the continued use of illegal fishing methods and other factors like pollution.

(9) Limited land and water resources available due to slow land reclassification

About 41% of the province total land area is still unclassified and all the municipalities in Sulu have not enacted their own local fishery ordinance. This is a major issue that has to be addressed. The impending reclassification of land has continued to deprive the province of its potential use and benefit

to its people. Classifying the land into its use such as alienable and disposable land, mineral and timber land is necessary in the formulation of programs under each category for productive purposes. This will be done to augment the existing land use component of the province and integrate it with proper strategies from different sectors concerned for its development and sustainability.

The upland and lowland farmers suffer from low productivity of crops owing to the marginalized lands they till, the limited farm size, antiquated farming practices and difficulty in bringing farm produce to market centers. Farmers are also resistant to new farming technologies. They would rather stick to traditional farm practices than adapt appropriate technologies. There is lack of financial windows for farmers to access capital for farm inputs. The marketing practice puts the farmers' into very disadvantageous position. They sell their products to creditors who charge exorbitant interest rates.

The fish catch of municipal fisher folks of Sulu has been significantly declining due to lack of fishing bancas and fishing gears, and they are forced to sell their catch at cheaper prices due to the very limited capacity of cold storage/ice plant. Excess fish catch would find their way to Zamboanga and Cebu in iced styro-boxes. The bigger volume of fish surplus would be shipped out to Manila since many Navotas-based trawl and deep-fishing operators fish in the Sulu Sea. As a result, small fisher folks still practice illegal fishing through the use of dynamite and cyanide to increase their depleted catch and to compete with the more superior commercial fishing vessels or purse seiners poaching the Sulu Sea.

Low agricultural production could be attributed to the inadequacy in irrigation facilities in municipalities. There are five units of Small Water Impounding Project (SWIP) in the municipalities of Indanan (Buansa), Luuk (Kanmindus & Kanmuni), Patikul (Kaunayan), and Talipao (Lungkiaban) constructed by DA-RFU-IX. Most of these are still functional but the service canal needs to be rehabilitated to have a good flow of water from the source to the rice area. Other communal irrigation projects (CIPs) were also constructed by NIA in some municipalities but others are non-functional. The rehabilitation/upgrading of these irrigation facilities could service an additional irrigated area which can produce an increased yield of paddy and other crops.

A.4.3 Prospects

Marine resources in and around Sulu have tremendous potentials for the development of the province, which would contribute to the Bangsamoro development as a whole. They include not only productive fishing grounds but also opportunities for seaweed cultivation and harvesting, rich coral reefs and marine sanctuaries for tourism and research purposes.

To promote protection and sustainable use of marine resources, proper law enforcement and management are indispensable. As the first step, a comprehensive marine resource survey may be undertaken by organizing a survey team consisting of all the stakeholders including the provincial administration, researchers and most importantly local fisher folks. Donor supports are highly expected to ensure internationally sound practices and judgments involving also international experts. The conduct of the survey involving local fisher folks should be taken as the opportunity to raise awareness among the provincial people on importance of the resources they have.

A number of crater lakes can be found in Jolo, of which most prominent are the Seit and Panamao lakes located in the municipalities of Panamao and Panglima Estino, respectively. These lakes may have a potential for mini-hydroelectricity. The Talipao springs provide a good water source to supply possibly 200,000 m^3 of potable water monthly. The development will require PHP 45 million in investments.

According to the data of the Bureau of Soil and Water Management (BSWM), there are three general types of soil covering Sulu: alfisols, inceptisols, and ultisols. On larger islands, soil is of igneous rock of volcanic origin while smaller islands have limestone soil that originates from coral formations. Jolo has the three major soil types as stated above. Pata and the Siasi-Tapul group have the inceptisol types of soil. Fertility management, inter-cropping, multi-storey cropping, annual crop rotation, cover cropping and land smoothing/clearing are the commonly recommended soil management and conservation practices for Sulu. There is a total area of 1,877.5 ha suitable for crop production in Sulu.

In terms of cassava production, Lanao del Sur ranks first followed by Basilan, Sulu and Tawi-Tawi. Sulu ranks third in the overall national production since cassava are the staple food of the province. In

the fishing sector, Sulu ranks 4th to the national production, since the Sulu Sea is one of the richest fishing grounds in the Country. One of the best qualities of abaca fiber is found in Sulu and its production ranks number one among the ARMM provinces and 16th in the Country.

Industries having high potentials to local economic growth include seaweeds, fruits, coconut, cassava and fisheries. Except for coconut which is processed as crude oil by BJ Coco Oil Mill, crops are exported as raw materials. Processing of these products will greatly contribute to the local economy of the province. Other competitive advantages of Sulu are mat weaving, development of white beaches and cultural and historical sites.

Given the limited land area and already dominant agricultural land use, it may be difficult to increase agricultural production significantly. Only opportunities for increasing crop production may be further promotion of mixed farming and small scale irrigated crop production. Livestock and poultry activities may be expanded at backyards. Considering the island topography, goat keeping may be more promising on slopes and under coconut trees. In addition to open sea fishery and seaweed harvesting, seaweed culture is promising as 90% the total coastal water in Sulu is suitable for seaweed culture.

The town of Jolo is expected to serve as the access point to and from other provinces and regions for the entire province. It should be equipped with all the basic functions as the largest urban center of Sulu. Its position should be upgraded from Tier III to Tier II in the urban hierarchy of Bangsamoro. A special economic zone may be established by the private sector or local government initiative, specialized in processing of marine products, among others.

A.5 Tawi-Tawi

A.5.1 Existing conditions

(1) Location and land

The province of Tawi-Tawi lies at the southwestern tip of the Country. It is located approximately between geographical coordinates of longitude 119°00' to 120°45' E and latitude 4°27' to 7°15' N. It is bounded on the north and west by the Sulu Sea, and on the south and east by the Celebes Sea.

Composed of 307 exotic islands and islets, Tawi-Tawi is the southern frontier of the Philippines. Due to its proximity to north Indonesia and east Malaysia, the province already had fostered good trade relations with them long before the Philippines became a republic.

Based on the data furnished by the Department of Budget and Management to the Regional Planning and Development Office, Tawi-Tawi has a total land area of 3,426.6 km^2, accounting for 12.8% of the ARMM's total land area. Tawi-Tawi has 67,251.8 ha A&D land or 61.9% and 41,488.2 ha or 38 % forest lands.

(2) Demography

As of 2010 census, Tawi-Tawi has a total population of 366,550, the fourth largest of the provinces of ARMM, accounting for 11.3% of the total ARMM population. Data show that Tawi-Tawi has an annual growth rate of 1.29% during 2000–10. Based on 2010 NSO data, the population density in Tawi-Tawi is 107.0/km^2.

In 2000, persons considered to be economically active in the age bracket of 15–64 years accounted for 57.8%, lower than the ARMM average. The young population belonging to the age bracket of 0–14 years old is 40.7%. While those 65 years old and above constituted only 1.48%. The number of households increased from 30,686 in 1990 to 37,140 in 2002.

Tawi-Tawi has the largest population of indigenous peoples of the ARMM provinces, recording 123,783 at the 2010 census. This accounts for 59.9% of the total IP population of 206,761 in the ARMM corresponding to 6.3% of the total ARMM population.

(3) Social services

The province of Tawi-Tawi has six hospitals, five government-owned and -controlled and one private. The total bed capacity of the five government hospitals is 130, corresponding to 1 bed per 3,420 persons. The private hospital has a bed capacity of 10.

In 2007, DOH workforce in Tawi-Tawi totaled 31 doctors, 38 nurses, 57 midwives, five dentists, five pharmacists, eight dentists, 15 medical technologists, sanitary inspectors, with 80 trained birth attendants and 156 action basic health workers (BHWs). Thus, in 2007, with an estimated population of 410,445 and a total of 31 doctors, the doctor-to-population ratio in Tawi-Tawi is 1 to 13,240. The nurse-to-population ratio is 1 to 10,801, and the midwives-to-population ratio is 1 to 7,208.

According to the DOH 2007 statistics, the crude birth rate per 1000 live births in Tawi-Tawi is 222.6, while crude death rate is 188.9 per 1,000 population. Maternal mortality rate per 1000 live births is 23.4. Infant mortality rate is 129.5 per 1000 live births.

According to the 1990 census of population, literacy rate decreased from 79.8% in 1990 to 73.5% in 2000. The literacy rate trending were almost the same magnitude for male and female. Literacy levels in the province are lower than the Country as a whole.

In 2007, the teacher/pupil ratio was 1:45 in both elementary and high schools. Classroom/pupil ratio was 1:53 in elementary and 1:60 in high school. While desk/pupil ratio in elementary is 1:03 and 1:04 in high school.

The only municipality in Tawi-Tawi that has a Level III water system is the capital town, Bongao. Yet, presently, supply is still insufficient for residents of Bongao. The Growth with Equity in Mindanao (GEM) by United State Agency for International Development (USAID) recently granted financial assistance for upgrading of the Bongao water supply system so that every household in Bongao will be properly served by the Bongao Water District. Most water supply sources in the island municipalities come from deep wells and rain-catchment systems.

(4) Economy

The province has an approximate area of 61,738.8 ha of alienable and disposable land, or 56% of the total land area of this province. This land is mostly located in Panglima Sugala, Bongao, Languyan, Sapa-Sapa and Simunul. The vast agricultural land of Tawi-Tawi especially the main island was planted with rice (337 ha), corn (527 ha), cassava (16,057 ha), coconut (35,304 ha), mango (868 ha), banana (1,204 ha), coffee (1,158 ha), vegetables (64 ha), fruits and other annual crops. There are also abaca and fruit-bearing trees. Seaweed is being cultured in 26,000 ha producing 241,200 ton in 2000. Fishing ground is approximately 54,000 km².

Its strategic location gives the province a definite edge over other ARMM and Philippine provinces in attracting trade and investment from the Brunei-Indonesia-Malaysia-Philippines East Asian Growth Area (BIMP-EAGA) member countries, and also with other ASEAN countries as well. The Tawi-Tawi territory today serves as a convenient sea route for international shipping with at least 100 foreign vessels passing through the Sibutu and the Bongao channels daily.

(5) Infrastructure

As of 2006, the Department of Public Works and Highways in Tawi-Tawi reported a total road network of 845.3 km. The roads consisted principally of gravel paved barangay roads (328.3 km) and concrete (9.51 km), unpaved provincial roads (250.6 km) and concrete (23.7 km), concrete national roads (33.2 km) and unpaved national roads (87.3 km), and concrete municipal roads (13.0 km), and unpaved municipal roads (99.7 km).

Port facilities need improvement in the municipalities of Bongao, Panglima Sugala, Mapun, Sitangkai, and Sibutu, where growing business and trading are experienced. The one and only shipping line doing business in Tawi-Tawi with a RO/RO facility is not sufficient to meet the shipping needs of Tawi-Tawi. The lesser frequency of trips of the shipping line has caused some cargoes to be left behind no matter how important it is, and causes overloading as well. Thus, there is a strong need for investments in

this area.

A fast craft that travels at 35 knots per hour plies the route from Zamboanga City at 5:45 AM every Monday and Thursday making a short stopover in Jolo, Sulu then on to Bongao, Tawi-Tawi and Sandakan, Sabah Malaysia and vice-versa. This carries only passengers of around 200 and is not for commercial cargoes. Sometimes, during peak seasons it is overloaded. There is a need for additional fast crafts to serve this route as there are growing commercial and business activities between Tawi-Tawi and BIMP-EAGA countries.

Only Cebu Pacific Airline is servicing Zamboanga–Tawi-Tawi–Zamboanga every day.

Tawi-Tawi has existing communal irrigation projects (CIPs) at Mapun and Panglima Sugala. These were undertaken by the National Irrigation Authority (NIA). Small water impounding and management projects (SWIMPs) were also implemented and constructed in Barangays Lapid-Lapid, Bongao and Tabulian, Mapun. The construction of the projects was undertaken through a contract and funded by the CARP funds of the Department of Agrarian Reform (DAR).

Potential irrigable areas would be irrigated under the communal irrigation project located at Languyan and Himba, Tandubas. These projects have an estimated cost of PHP 85.0 million. These irrigation projects would help the lowland farmers increase rice production of the province.

A.5.2 Constraints

(1) Deteriorating forest and land resources

The deteriorating forest and land resources need to be rehabilitated, conserved and well-managed through the conduct of reforestation especially on denuded areas covering at least 10% per annum. For this purpose, full participation of the concern people/communities to is to be encouraged to rehabilitate forest and land resources like in community based forest management (CBFM), integrated social forestry (ISF) and contract reforestation, and environmental laws enforcement should be strengthened.

The degradation of forest and other protected areas should be given such concern to minimize the catastrophic effect. This could be undertaken through proper conservation, management and rehabilitation of denuded protected areas by effective management of existing protected areas in the province and declare them in accordance with NIPAS Law of 1992.

(2) Degradation of coastal and marine resources

The degraded coastal and marine resources should be given priority through proper management and protection by raising awareness amongst people/communities on the protection of these resources. This can be done by establishing more marine protected areas (MPAs), minimizing illegal and destructive fishing, and conducting proper delineation of municipal waters.

(3) Improper utilization of lands according to its classification

The improper utilization of land based on its classification must not be tolerated. An effective and efficient system of land classification should be employed through conduct of land classification for the entire province. Unguided land classification based on its suitability must not be encouraged. Proper utilization should be promoted through conduct of studies on appropriate suitable crops for every piece of land and development of mapping system showing the suitability for every piece of land for certain crops.

(4) Inadequate infrastructure

Infrastructure facilities are largely inadequate in Tawi-Tawi as listed below:

- Inadequate potable water supply,
- Inadequate power supply,
- Lack of telecommunication services,
- Absence of seaport with complete facilities and amenities,

- Lack of causeways and footbridges,
- Limited road pavement, and
- Poor farm to market roads.

In addition, the following degrade the environment and limit economic development:

- Improper solid waste disposal,
- Lack of sewerage system,
- Absence of cold storage plant, and
- Absence of seaweeds processing plant.

(5) Poor social services

Social services in Tawi-Tawi are inadequate as indicated as follows. In health, the following indicate the inadequate provision of health services:

- High incidence of malnourished children,
- High incidence of maternal mortality rate and infant mortality rate, and
- Lack of health personnel, health facilities in the far flung island barangays in the province.

The population growth with increasing share of young population will make the improvement of health services even more challenging.

In education, the following problems are pointed out:

- High illiteracy rate,
- Lack of teacher items for the province,
- Incompetent teachers in the far-flung island barangays and municipalities,
- Insufficient supply of textbooks, chairs at different fields of subject areas and other instructional materials,
- Lack of school facilities/amenities (e.g., desks, chairs, and computers), and
- Lack of sufficient school buildings.

In social welfare, the following problems are highlighted:

- Existing daycare centers not accredited;
- Lack of daycare centers in some barangays;
- No support by local administrations for the establishment of daycare centers in their respective barangays;
- Lack of daycare workers;
- Lack of facilities, teachers, tables, toys, and other daycare support paraphernalia;
- Dilapidated daycare centers;
- Low subsidy given by LGUs to wages of daycare workers;
- Inadequate capability of daycare workers to deliver updated services;
- Inadequate support to the elderly, disabled and indigenous peoples (IPs); and
- Absence of violence against women and children (VAWC) centers.

A.5.3 Prospects

Despite many problems constraining the development of Tawi-Tawi as seen above, the province has high potentials in some areas. First and foremost, its location at the southwestern end of the Country make Tawi-Tawi favorably located in relation to the BIMP-EAGA. With strong historical ties with some areas of the neighboring countries, trading activities are already sizeable. Located along the international shipping route, Tawi-Tawi can attract increasing investment and trade from these countries.

To support trade based development, port facilities should be improved and shipping services increased by fast crafts. Specifically, the following may be undertaken in steps to improve port facilities:

- Expansion of eight wharves: Bongao, Sitangkai, Sibutu, Panglima Sugala, Languyan, Ubol Simunul, Sapa-Sapa and Mapun,
- Construction of the Malassa seaports and terminal,

- Expansion and dredging of Chinese Pier and Ridjiki Boulevard,
- Construction of causeways: Ungus Matata, Bas-Bas, Kualabaro, and
- Opening/rehabilitation of footbridges pier heads.

Agriculture in the province can be much expanded by utilizing the vast A&D land and denuded forest areas. In addition to cassava and coconut, other commercial crops should be expanded such as abaca and fruit trees aiming at export markets. Planting with fruit trees will contribute to productive reforestation in denuded forest areas. Mixed farming combining tree crops and field crops may be undertaken where soil conditions are relatively favorable.

Existing irrigation facilities should be fully utilized, and ongoing irrigation development should be completed. In addition, new small scale irrigation schemes can be developed with small dams and water impoundments. Construction of a dam and pumping facilities at the Upper Malum River, Panglima Sugala has been conceived.

Capture fishery and seaweed production present another major opportunity for development of the provincial economy. The vast fishing ground should be effectively utilized to increase fish production for export markets. Seaweed culture can also be expanded, especially if processing facilities are established.

The provincial territory should be integrated by improving the road links in the main island and establishing shipping route linking island municipalities. The following roads and bridges are considered important for the purpose:

- Construction of the BatuBatu–Parangan–Sumbilang–Paraitan–KulaKula–Himba–Kulabaru circumferential road,
- Construction of Tarawakan–Tumahubong–Magsaggao–BakkawBakkaw–Languyan circumferential road,
- Construction of bridges: Suba Manangkay, Dulang-Dulang, Baldatal, Paraitan, Palate-Sapa-Sapa, Sikiat-Pakias, and
- Construction of footbridges: Tabawan proper, Sapa-Sapa, Banaran, Dungon, Baldatal, Turtle Island, Tandubato, Palate, Sitangkai proper, LA, Mantabuan,

Proper environmental management is a prerequisite to sustainable development of the provincial economy to solve the existing environmental problems and prevent future problems. The following are considered particularly important:

- Construction of shore protection in Bongao, Sanga-Sanga, Panglima Sugala, Sibutu, Tandubas, Mapun, and Languyan,
- Construction of drainage and sewerage system in Bongao and Panglima Sugala, and
- Acquisition of land for garbage sites and garbage trucks of 2 ton capacity.

CHAPTER 9 FRAMEWORKS FOR BANGSAMORO DEVELOPMENT

9.1 Socio-economic Framework

9.1.1 Existing socio-economy of the Philippines and Bangsamoro

(1) Population and employment

Population, labor force and employment data are compared in Table 9.1 for the Philippines, and the six regions in Mindanao including the ARMM area. Based on the 2010 census population, the population in 2012 is estimated by applying the average population growth rates by region as well as for the Philippines assumed by the National Statistical Office (NSO) for a medium growth case. Labor and employment related data are compiled consistently for 2012, the latest year when more or less consistent data are available from official statistics.

The ratio of the working age population to the total population or the labor force coefficient (LFC) in ARMM is actually higher than that in the Philippines and Mindanao. This implies that the labor seeking outmigration from the ARMM is not as significant as assumed from the limited employment opportunities due to security conditions. The ratio of labor force to the working age population or the labor participation rate (LPR), however, is significantly lower in the ARMM than all the other regions in Mindanao as well as the LPR in the Philippines as a whole. This reflects the fact that comparatively more people stay away from the labor force to engage in conflicts and related activities.

The average population growth rate in the ARMM during 2000–10 is reported by the Philippines Statistics Authority as 1.51%. This is lower than most other regions in Mindanao except Caraga having 1.49% population growth, and much lower than the national average of 1.90%. The ratio of urban population to the total population was 17.7% in 2007, decreased to 13.7% in 2010, the lowest of all the regions in the Country. The urbanization rates in other regions in Mindanao are much higher: highest at 59.3% in Davao, followed by 46.5% in SOCCSKSARGEN and 41.3% in Northern Mindanao in 2010. The average urbanization rate in the Country is 45.3% in the same year.

Table 9.1 Comparison of Population, Labor Force and Employment Data by Region in Mindanao and the Philippines

		Philippines	Regions						
	Unit		IX	X	XI	XII	XIII	ARMM	Minadanao
Population (2010 census)	1,000	92,338	3,407	4,297	4,469	4,110	2,429	3,256	21,968
Population growth*	% p.a.	1.836	1.958	1.990	1.540	2.085	1.890	2.113	
Estimated population (2012)	1,000	95,760	3,542	4,470	4,608	4,283	2,522	3,395	22,819
Working age population (2012)	1,000	63,303	2,185	2,980	3,060	2,653	1,713	2,269	14,860
Labor force (2012)	1,000	40,433	1,438	2,028	1,948	1,779	1,107	1,313	9,613
Employment (2012)	1,000	37,670	1,389	1,924	1,854	1,708	1,060	1,267	9,202
Labor force coefficient (2012)	%	66.1	61.7	66.7	66.4	61.9	67.9	66.8	65.1
Labor participation rate (2012)	%	63.9	65.8	68.1	63.7	67.1	64.6	57.9	64.7
Unemployment rate (2012)	%	6.83	3.41	5.13	4.83	3.99	4.25	3.50	4.28
Note: *Average growth rate for 2010-15 of medium assumption by NSO									
Source: NSO, 2012 Philippine Yearbook									

(2) GDP/GRDP and productivity

GDP/GRDP and employment by economic sector in the Philippines and Bangsamoro are summarized in Table 9.2. Both economic and employment structure is significantly different between the Philippines and Bangsamoro. The share of agriculture in the GDP is 11.1% in the Country in 2012, while the share of agriculture in the GRDP is 65.4% in Bangsamoro in 2013. The share of industry is significant in the Philippines at 32.0%, and that of services exceeds 50% of the GDP. The share of industry in Bangsamoro is only 4.5%, and that of services is 30.0%.

Table 9.2 GDP/GRDP and Employment by Sector in the Philippines and Bangsamoro

Philippines (2012)							
GDP	PhP. million	Share (%)	Employment	1,000	Share (%)	GDP/Employment	PhP. 1,000
Agriculture	698,937	11.1		12,167	32.3		57.4
Industry	2,022,623	32.0		5,688	15.1		355.6
Services	3,590,112	56.9		19,814	52.6		181.2
Total	6,311,671	100.0		37,670	100.0		167.6
Bangsamoro (2013)							
GRDP	PhP. million	Share (%)	Employment	1,000	Share (%)	GRDP/Employment	PhP. 1,000
Agriculture	66,162	65.4		840	68.3		78.8
Industry	4,582	4.5		30	2.4		152.7
Services	30,348	30.0		359	29.2		84.5
Total	101,091	100.0		1,229	100.0		82.3
Sources:							
NSO, 2012 Philippine Yearbook (Philippines)							
Philippines Statistics Authority (Bangsamoro)							

The dominance of agriculture in Bangsamoro is more conspicuous in employment with a 68.3% share in the total employment in 2013. The share of industry in employment of Bangsamoro is mere 2.4%.

The ratio between the GDP/GRDP and employment, called total factor (TF) labor productivity, is calculated by sector and also shown in Table 9.2. It is interesting to note that the TF labor productivity of agriculture in Bangsamoro is in fact higher than the national average. The TF labor productivity in industry and services is much lower in Bangsamoro than the respective averages in the Philippines.

9.1.2 Projection of Bangsamoro socio-economy

(1) Rationale and assumptions

The socio-economy of Bangsamoro is projected to the target year of 2022 to set a socio-economic framework for the Bangsamoro development. For the projection purposes, the data on the ARMM as presented above are taken to represent the baseline for Bangsamoro.

The socio-economic projection should reflect ideas of the Bangsamoro development, and specifically the following ideas should be incorporated in the projection:

1) The share of agriculture in the GRDP should decrease significantly from 65% in 2012 to less than 50%.
2) The share of industry should increase significantly from 4.5% in 2012.
3) The service GRDP would increase induced by the development of agricultural and industrial activities.

For a crude projection, the inducement factor of services by agriculture and industry is assumed to be 0.6 and 1.2 in 2022. If the share of agriculture is assumed to be reduced to 45% of the GRDP, the shares of industry and services are calculated to be about 13% and 42%, respectively in2022.

Agriculture as the mainstay of the Bangsamoro economy is assumed to grow at a steady rate of 3% per annum. The TF labor productivity in agriculture is assumed also to increase steadily at the annual average rate of 2%. The TF labor productivity in industry and services will increase at much higher rates and 2.5% and 3.0% are assumed for industry and services, respectively.

The LPR in Bangsamoro is expected to increase significantly as peace is firmly established. It is assumed that the LPR will increase to 65% in Bangsamoro in 2020, comparable to the levels in other developed regions in Mindanao. The LFC will increase as job seeking outmigration decreases as more employment opportunities are generated by active economy under much better security conditions in Bangsamoro. Birth rates may also increase under peace, which will increase the LFC in medium to long terms. As more people, including women, pursue higher education, and stay away from the labor

force, however, the LFC may decrease. As a composite results of these factors, it is assumed that the LFC will increase slightly to 68% in Bangsamoro in 2022.

(2) Projections

The agricultural GRDP is projected to increase from PHP 66,162 million in 2013 to PHP 86,326 million at the average annual rate of 3% as assumed (Table 9.3). This corresponds to 45% of the GRDP, and therefore the GRDP in 2022 is calculated to be PHP 191,836 million. This represents the average annual GRDP growth at 7.4%. The industrial and the service GRDP are calculated to be PHP 24,939 million and PHP 80,571 million, respectively.

The TF labor productivity will increase from PHP 78,800 to PHP 94,200 per employment in agriculture, from PHP 152,700 to PHP 190,700 in industry and from PHP 84,500 to PHP 110,300 in services during 2013–22. The projected GRDP is converted to employment by sector by applying the TF labor productivity by sector. Thus, the employment in 2022 is calculated to increase from 840,000 to 917,000 in agriculture, from 30,000 to 131,000 in industry and from 359,000 to 731,000 in services for the total employment of 1,778,000 in 2022 in Bangsamoro.

Table 9.3 Projections of GRDP and Employment by Sector in Bangsamoro

	GRDP (PHP 10^6)		Growth	TF labor prod. (PHP 10^3)		Increase	Employment (10^3)	
Sector	2013	2022	(% p.a.)	2013	2022	(% p.a.)	2013	2022
Agriculture	66,162	86,326	3.0	78.8	94.2	2.0	840	917
Industry	4,582	24,939	20.7	152.7	190.7	2.5	30	131
Service	30,348	80,571	11.5	84.5	110.3	3.0	359	731
Total	101,092	191,836	7.4	82.3	107.9	3.1	1,229	1,778

Source: JICA Study Team.

The total employment of 1,778,000 is converted to the population in 2022 by applying LPR and LFC. By applying the LPR of 65% as assumed, the total labor force is calculated to be 2,735,000. By further applying the LFC of 68% as assumed, the total population is calculated to be 4,023,000 in 2022. This represents the average annual population increase of 1.71%.

Of the service employment of 731,000, the portion derived from agriculture is estimated to be 450,000 and the portion derived from industry 281,000. It is assumed that the former is generated equally in rural and urban areas and the latter exclusively in urban areas. The total employment will be 1,142,000 in rural areas and 636,000 in urban areas. By applying the same LPR and LFC to rural and urban employment, the rural and urban population is calculated to be 2,584,000 and 1,439,000 in 2022. This implies that the urbanization rate in Bangsamoro will increase from 15% in 2013 to 36% in 2022.

The per capita GRDP of Bangsamoro was PHP 29,158 in 2013. This corresponds to 44% of the per capita GDP of the Philippines in 2012. The per capita GRDP of Bangsamoro will increase to PHP 47,685 in 2022, equivalent to 72% of the per capita GDP in 2012. The socio-economic framework for Bangsamoro regional development to the year 2022 is summarized in Figure 9.1.

9.2 Spatial Framework

9.2.1 Urban hierarchy in Mindanao

(1) Urban hierarchical analysis

A hierarchical structure of urban centers is analyzed as part of regional development planning to plan for improvement of various urban facilities and services for urban and rural residents. Since the public sector resources for development are limited, they should be allocated to different urban centers in the most effective way to ensure the best overall services for the people. For this purpose, urban centers at different hierarchical levels are assigned with different urban services to optimize the provision of various urban services under the resource constraints.

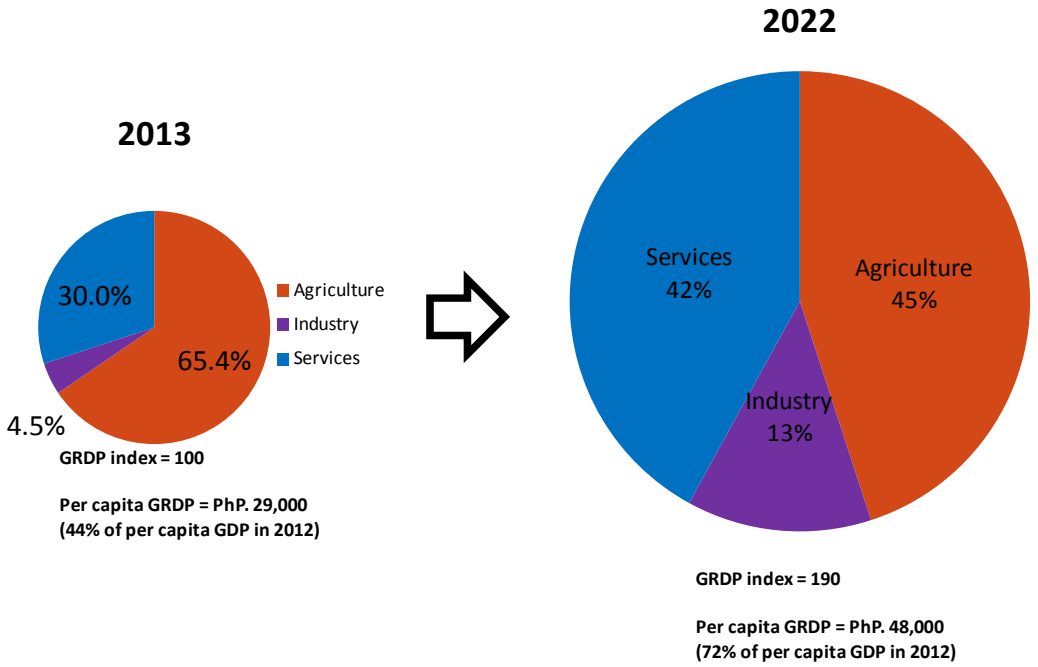


Figure 9.1 Socio-economic Framework for Bangsamoro Regional Development to 2022

An urban hierarchical analysis is conducted for urban centers in Mindanao as a whole. By the urban hierarchical analysis, many urban centers are compared by a set of socio-economic indices to assess development potentials first based on existing conditions. In the present analysis, only population related indices and existing urban classification systems are used as other socio-economic data are not readily available for all the urban centers in Mindanao.

The data used for the analysis are summarized in Table 9.4 by selected indices with the score by each index. The indices used are the total population at the 2010 census, population growth during 2000–10, income class by the existing Philippine classification, and city classification by the Philippine administrative system. The total score by city is calculated just by adding score by each index. All the urban centers are classified into five tiers according to the criteria given in Table 9.5.

Table 9.4 Classification Indices of Urban Centers

Index	Classification	Score
2010 population	Over 100,000	3
	80,000–100,000	2
	60,000–80,000	1
	< 60,000	0
Population growth 2000–10	≥ 1.50	3
	1.25–1.49	2
	1.00–1.24	1
	≤ 0.99	0
Income class	1st–3rd cities	3
	4th–6th cities	2
	1st–3rd municipalities	1
	4th–6th municipalities	0
City category	Highly urbanized cities	3
	Independent component cities	2
	Component cities	1
	Other municipalities	0

Table 9.5 Classification of Urban Centers into Five Tiers

Tier	Score	Urban centers involved (n)
I	10–12	7
II	7–9	16
III	4–6	45
IV	1–2	109
V	0–1	163

(2) Existing urban hierarchy in Mindanao

The existing hierarchical structure of urban centers by this analysis is illustrated in Figure 9.2. Detailed data on urban centers at higher tiers are summarized in Table 9.6 for Tier I cities and Table 9.7 for Tier II cities.

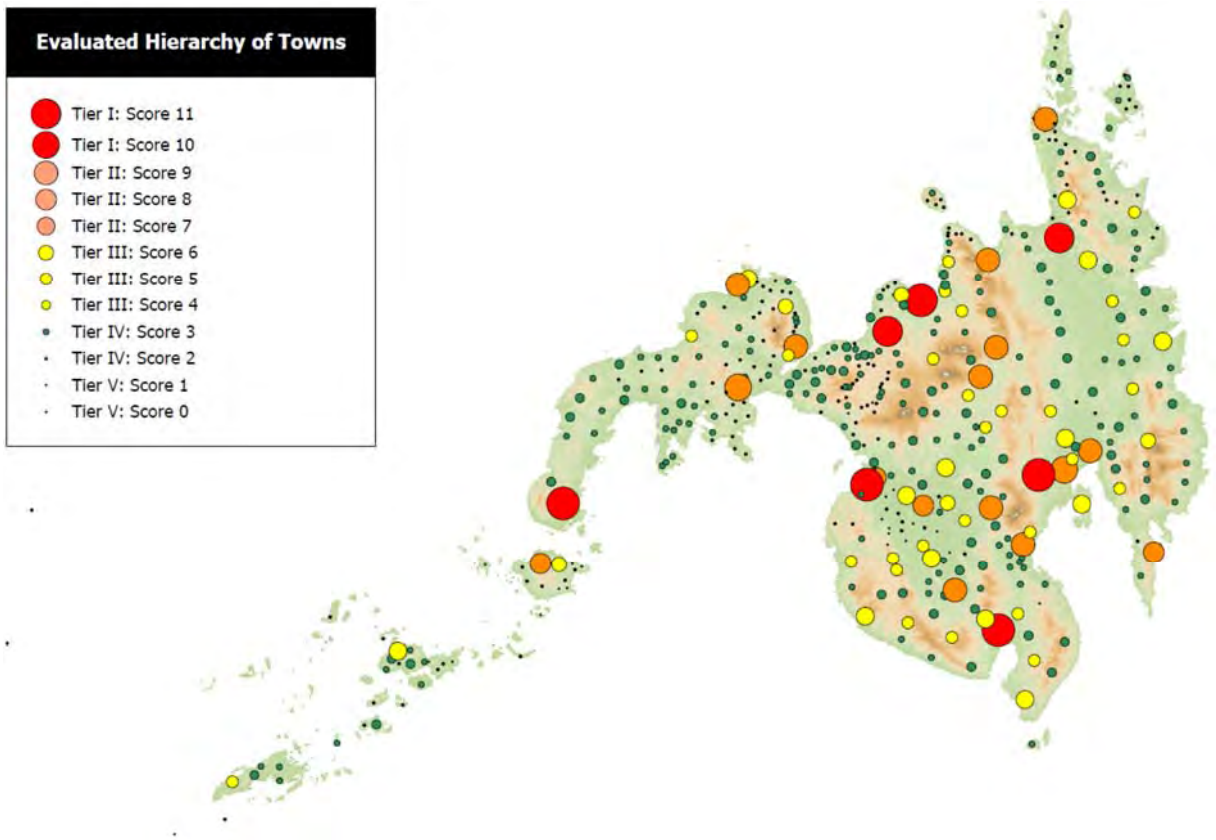


Figure 9.2 Existing Urban Hierarchy in Mindanao

Table 9.6 Profiles of Tier I Cities

City	Population 2010	Pop. change (2010/2000)	Income class	City category	Score
Butuan City (Capital)	309,709	1.18	1st	HUC	10
Cagayan de Oro City	602,088	1.31	1st	HUC	11
Cotabato City	271,786	1.66	3rd	ICC	11
Davao City	1,449,296	1.3	1st	HUC	11
General Santos City	538,086	1.31	1st	HUC	11
Iligan City	322,821	1.13	1st	HUC	10
Zamboanga City	807,129	1.35	1st	HUC	11

HUC = highly urbanized city; ICC = independent component city

Table 9.7 Profiles of Tier II Cities

City	Population 2010	Pop. change (2010/2000)	Income class	City category	Score
Surigao City (Capital)	140,540	1.23	3rd	CC	8
Sultan Kudarat (Nuling)	181,417	1.91	1st	M	7
Marawi City (Capital)	187,106	1.43	4th	CC	8
Koronadal City (Capital)	158,273	1.18	3rd	CC	8
Pikit	113,014	1.65	1st	M	7
Kidapawan City (Capital)	125,447	1.24	3rd	CC	8
Mati City (Capital)	126,143	1.19	5th	CC	7
Digos City (Capital)	149,891	1.20	2nd	CC	8
Tagum City (Capital)	242,801	1.35	1st	CC.	9
Panabo City	174,364	1.30	3rd	CC	9
Gingoog City	117,908	1.15	2nd	CC	8
Ozamis City	131,527	1.19	3rd	CC	8
Valencia City	181,556	1.23	2nd	CC	8
Malybalay City (Capital)	153,085	1.24	1st	CC	8
Isabela City (Capital)	97,857	1.42	4th	CC	7
Pagadian City (Capital)	186,852	1.31	2nd	CC	9
Dipolog City (Capital)	120,460	1.21	3rd	CC	8

Notes: CC = Component City; M = Municipality

From the results of the urban hierarchical analysis, the following are observed:

1) Cotabato City has the highest score of all the urban centers at 11 points together with Cagayan de Oro, Davao, General Santos and Zamboanga.
2) Within Bangsamoro, Marawi City has the highest score at 8, followed by Sultan Kudarat and Isabela City at 7.
3) Other urban centers having high score near Bangsamoro are Kidapawan in North Cotabato, Valencia City and Malaybalay in Bukidnon, and Koronadal City in South Cotabato at 8, and Pikit on the border between Maguindanao and Bukidnon at 7.
4) These urban centers are ranked high due mainly to their income classes and the administrative status.
5) Other conditions contributing to the high ranks are the high population growth of Sultan Kudarat having the highest population growth, and Pikit.
6) Isabela City is ranked high due to its income class and administrative status despite relatively small population.
7) Island provinces of Bangsamoro are poorly represented by urban centers at higher tiers.

9.2.2 Urban axes and economic corridors in Mindanao

(1) Comparison of urban axes

As part of effort to evaluate the spatial distribution of development, alternative urban axes are compared with respect to the concentration of urban population along the respective axes. The urban population in any city is taken here as a proxy of the development representing the concentration of economic activities in respective urban centers. Higher concentration of urban population along any axis implies higher development potential through active interactions of economic activities between the urban centers as well as within each urban center.

For the analysis, eight alternative urban axes are defined as follows (Figure 9.3).

① Cotabato–Sharif Aguak–Surallan–Koronada–General Santos
② Cotabato–Sharif Aguak–Surallan–Koronada–General Santos–Davao
③ Cotabato–Sultan Kudarat–Kabacan–Kidapawan–Digos
④ Cotabato–Sultan Kudarat–Kabacan–Kidapawan–Digos–Davao

⑤ Cotabato–Sultan Kudarat–Kabacan–Carmen–Valencia–Cagayan de Oro
⑥ Cotabato–Parang–Malabang–Marawi–Iligan
⑦ Cotabato–Parang–Malabang–Marawi–Iligan–Cagayan de Oro
⑧ Cotabato–Parang–Malabang–Pagadian–Zamboanga

Figure 9.3 Alternative Urban Axes of Bangsamoro

For each urban axis, the total road length, urban population in all the cities along the axis, and the corresponding population concentration per km of road length are calculated as summarized in Table 9.8. The following are observed from the table.

Table 9.8 Comparison of Alternative Urban Axes

Urban axis	Approx. road length (km)	End point	Population along axis (2010)	Population concentration (/km)	Municipalities (n)	Cities along axis (n)	Total urban score along axis
①	200.0	General Santos	1,502,773	7,514	19	3	51
②	329.1	Davao	3,465,004	10,529	28	5	88
③	173.6	Digos	1,569,740	9,042	18	3	74
④	222.8	Davao	3,100,129	13,914	20	4	89
⑤	282.1	Cagayan de Oro	1,959,574	6,946	20	2	80
⑥	157.1	Iligan	1,298,629	8,266	23	2	56
⑦	231.0	Cagayan de Oro	2,148,583	9,301	33	4	85
⑧	385.6	Zamboanga	2,269,264	5,885	29	3	80

(1) The total population along urban axes linking two port cities at both ends (urban axis 1, 3, 5, 6, and 8) is the largest for the Cotabato–Pagadian–Zamboanga axis, but the population concentration is the lowest for this axis.

(2) The population concentration is the highest for the Cotabato–Digos–Davao axis, followed by the Cotabato–General Santos–Davao axis due to the high population concentration between General Santos and Davao, particularly in Davao.

(3) If this section is excluded from these axes, the Cotabato–General Santos axis has larger population concentration than the Cotabato–Digos axis.

(4) The population concentration along the Cotabato–Malawi–Iligan axis is lower than its extension to Cagayan de Oro due to the high population concentration between Iligan and Cagayan de Oro, particularly in Cagayan de Oro.

(5) The inland axis to Cagayan de Oro passing through Kabacan, Carmen, and Valencia has the lowest population concentration, which is still higher than the concentration along the Cotabato–Pagadian–Zamboanga axis.

(2) Possible economic corridors for Bangsamoro

The Bangsamoro region is and will continue to be an agricultural region, and the Bangsamoro development will depend on the development of broad agriculture including fishery and agro-related industries. As an effective strategy for broad-based development, economic corridors should be established along the urban axes. To identify more promising economic corridors, existing agricultural activities and land potentials for agriculture have been analyzed by using a GIS.

Existing agricultural value

To calculate existing agricultural value along the urban axes, first a map of agricultural value in PHP million per ha was produced by overlaying provincial boundary and existing land use data sets from SERD-CAAM using GIS. This agricultural land map was then linked with agricultural value data from the Bureau of Agricultural Statistics (BAS) to produce a map of agricultural value by province. Each urban axis was buffered by 10 km and overlain on this agricultural value map by province to construct the final map of agricultural value along the urban axes. The results are shown in Figure 9.4.

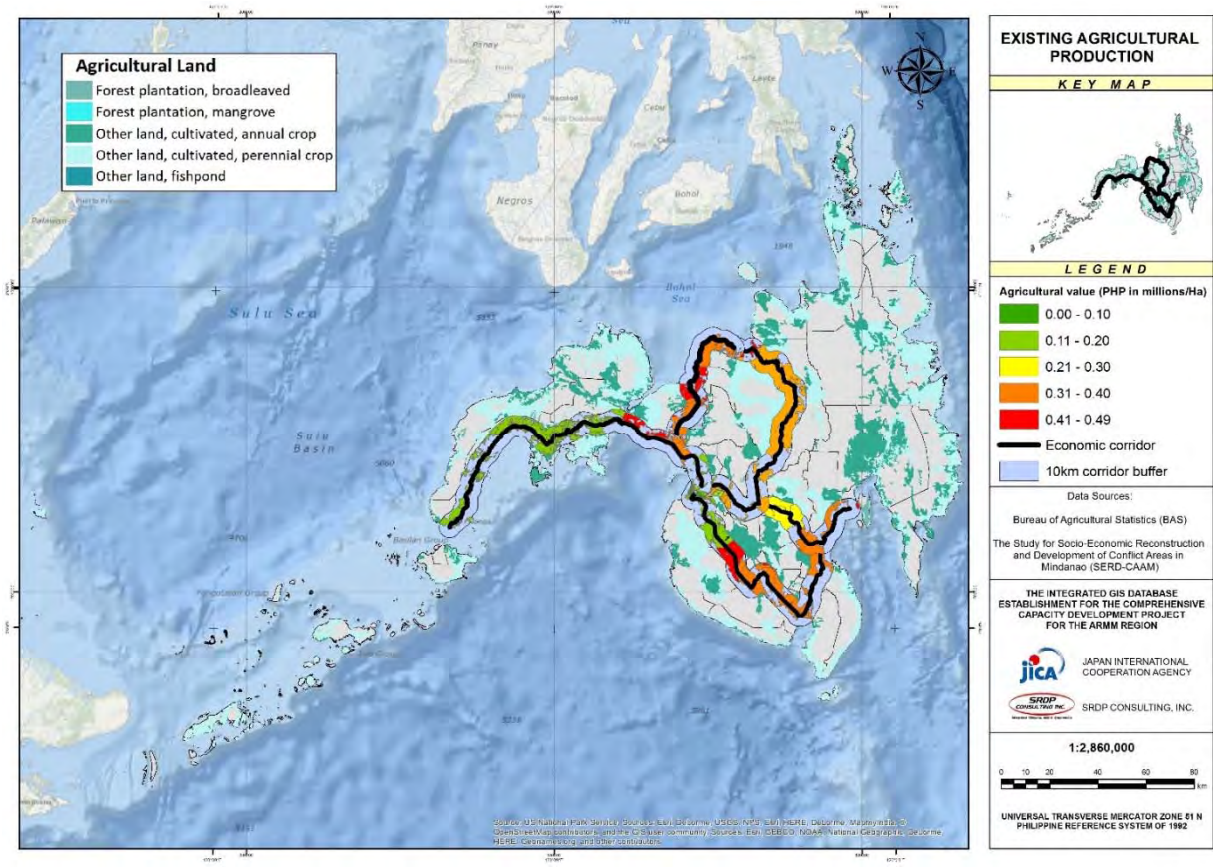


Figure 9.4 Agricultural Value Map of Bangsamoro along Urban Axes

Agricultural potentials

The agricultural potential map was produced by overlaying the crop/commodity suitability map with the

buffered urban axes as defined above. The results are shown in Figure 9.5. In the map, it can be observed that the buffered urban axes intersect suitable areas for mostly multi-crop and production forest.

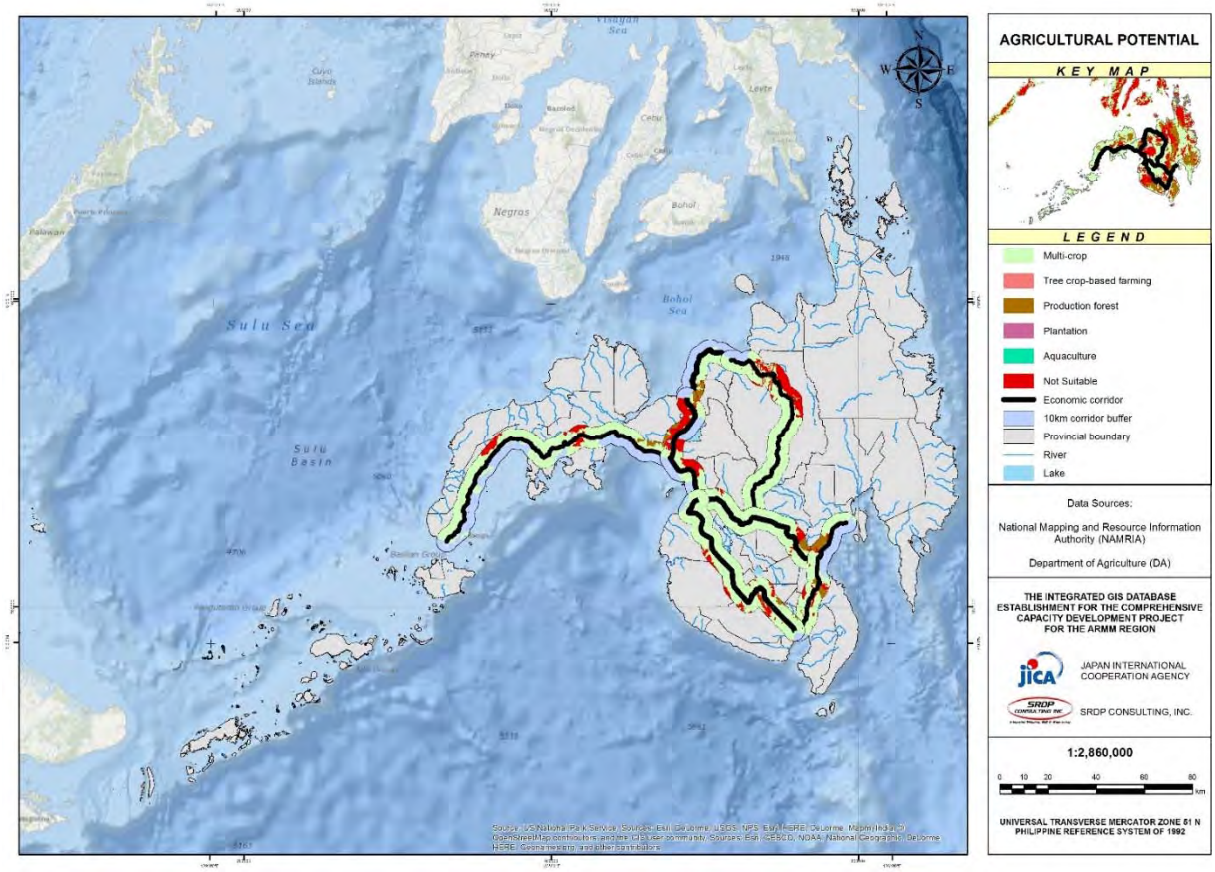


Figure 9.5 Agricultural Potential Map of Bangsamoro along Urban Axes

(3) More promising economic corridors

For each urban axis, the total road length, total existing agricultural value, total suitable agricultural area, and the corresponding linear concentration per km of road length are calculated. The results are summarized in Table 9.9.

Table 9.9 Evaluation of Urban Axes by Existing Agricultural Production and Agricultural Land Potential for Potential Economic Corridors

Urban axis	Length (km)	Existing agricultural production				Existing agricultural potential		
		Total agricultural area (ha)	Total agricultural value (PHP 10^6)	Density (PHP 10^6/km)	Rank	Total suitable agricultural area (ha)	Density (ha/km)	Rank
①	**209.77**	**258,990.70**	**82,189.44**	**391.81**	**1**	**386,316.00**	**1,841.62**	**2**
②	352.86	346,442.27	111,789.18	316.81	3	566,750.62	1,606.16	5
③	160.61	188,822.79	47,666.37	296.78	5	311,327.72	1,938.41	1
④	211.13	215,097.29	56,590.82	268.04	7	362,436.43	1,716.65	3
⑤	310.32	337,549.50	86,005.38	277.15	6	517,861.07	1,668.80	4
⑥	133.76	130,122.06	45,253.95	338.32	2	141,211.04	1,055.70	7
⑦	223.82	196,318.43	69,764.93	311.70	4	219,798.84	982.03	8
⑧	414.05	351,358.95	76,397.02	184.51	8	510,859.95	1,233.81	6

The evaluation by existing agricultural value ranks the Cotabato–Sharif Aguak–Surallan–Koronada–General Santos axis as the highest, followed by the Cotabato–Parang–Malabang–Marawi–Iligan axis as the second and the Cotabato–Sharif Aguak–Surallan–Koronada–General Santos–Davao axis as the third. The evaluation by agricultural land potential finds the Cotabato–Sultan Kudarat–Kabacan–Kidapawan–Digos axis the highest, followed by the Cotabato–Sharif Aguak–Surallan–Koronada–General Santos

axis as the second and the Cotabato–Sultan Kudarat–Kabacan–Kidapawan–Digos–Davao axis the third.

Based on these results, three urban axes may be identified as more promising for economic corridor development. They are as follows in the order of potential:

1) Cotabato–Sharif Aguak–Surallan–Koronada–General Santos,
2) Cotabato–Sultan Kudarat–Kabacan–Kidapawan–Digos, and
3) Cotabato–Parang–Malabang–Marawi–Iligan.

These potential economic corridors are defined as follows:

Northern corridor: Cotabato–Parang–Malabang–Marawi–Iligan

This corridor has high potential for agricultural growth due to suitability of soil and availability of large agricultural land. The conditions of road however are currently poor in terms of road surface and road alignment. This road is not yet suitable for container traffic due to sharp curves that limit maneuverability. This corridor is served by the Macabalan port and the Laguindingan airport of Cagayan de Oro is also available nearby.

Central corridor: Cotabato–Sultan Kudarat–Kabacan–Kidapawan–Digos

This corridor is passing Mindanao's largest plain and produces most of the region's rice supply. The road conditions are generally good and there is an ongoing effort by DPWH to widen the road carriageway from two-lanes to four-lanes. This corridor is served by the Sasa port and the Davao international airport of Davao City is also available nearby.

Southern corridor: Cotabato–Sharif Aguak–Surallan–Koronada–General Santos

Newly identified sites for banana and cacao plantations are along this corridor in the town of Talayan. Road conditions of this corridor are generally good and efforts by DPWH for expansion from two-lane to four-lane have been on-going for years. This corridor is served by the Makar wharf and the General Santos international airport of General Santos.

9.2.3 Land potential and land use

(1) Land use framework

Existing land use and land potential present another aspect of spatial framework for the Bangsamoro development. The existing land use and land suitability by crop/commodity are analyzed, and future land use is determined by using GIS. The analyses cover the entire Mindanao.

The GIS analysis used data on Mindanao's existing forest cover from the Socio-Economic Reconstruction and Development of Conflict Affected Areas in Mindanao (SERD-CAAM) and agro-edaphic suitability (AES) from the Department of Agriculture-Philippine Rural Development Project (DA-PRDP). It involved the preparation of (1) an existing land use map, (2) a crop/commodity suitability map, and (3) a land use conversion matrix. These data were integrated to construct the future land use map.

(2) Analysis on existing land use

The existing land use map was constructed using forest cover data for Mindanao from SERD-CAAM (2008) as shown in Figure 9.6. More generalized divisions were assigned for these original land classes (Table 9.10). The generalized land use map, shown in Figure 9.7, divided the area into the following land classes: (1) natural forest, (2) production forest, (3) mangrove forest, (4) natural marshland, (5) wooded land, (6) natural grassland, (7) cropland, (8) aquaculture, (9) built-up area, (10) barren land, and (11) inland water.

The existing land use by province is tabulated in Table 9.11. The distribution of open and closed forests by province is summarized in Table 9.12 (Figure 9.8).

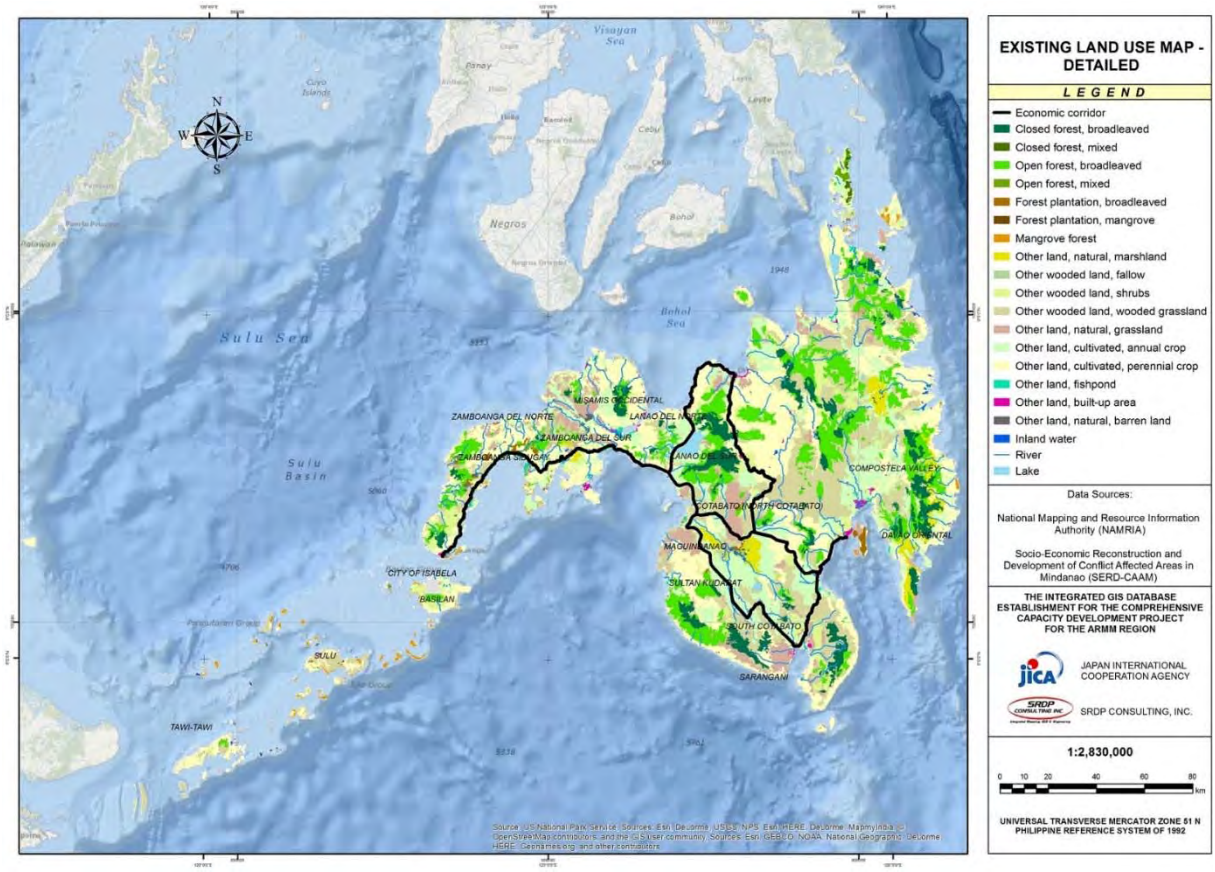


Figure 9.6 Detailed Existing Land Use Map

Table 9.10 Generalized Land Use Classes

Original existing land cover	Generalized existing land cover
Closed forest, broadleaved	Natural forest
Closed forest, mixed	
Open forest, broadleaved	
Open forest, mixed	
Forest plantation, broadleaved	Production forest*
Forest planation, mangrove	
Mangrove forest	Mangrove forest
Other land, natural, marshland	Natural marshland
Other wooded land, fallow	Wooded land
Other wooded land, shrubs	
Other wooded land, wooded grassland	
Other land, natural, grassland	Natural grassland
Other land, cultivated, annual crop	Cropland*
Other land, cultivated, perennial crop	
Other land, fishpond	Aquaculture*
Other land, built-up area	Built-up area
Other land, natural, barren land	Barren land
Inland water	Inland water

*Agricultural land

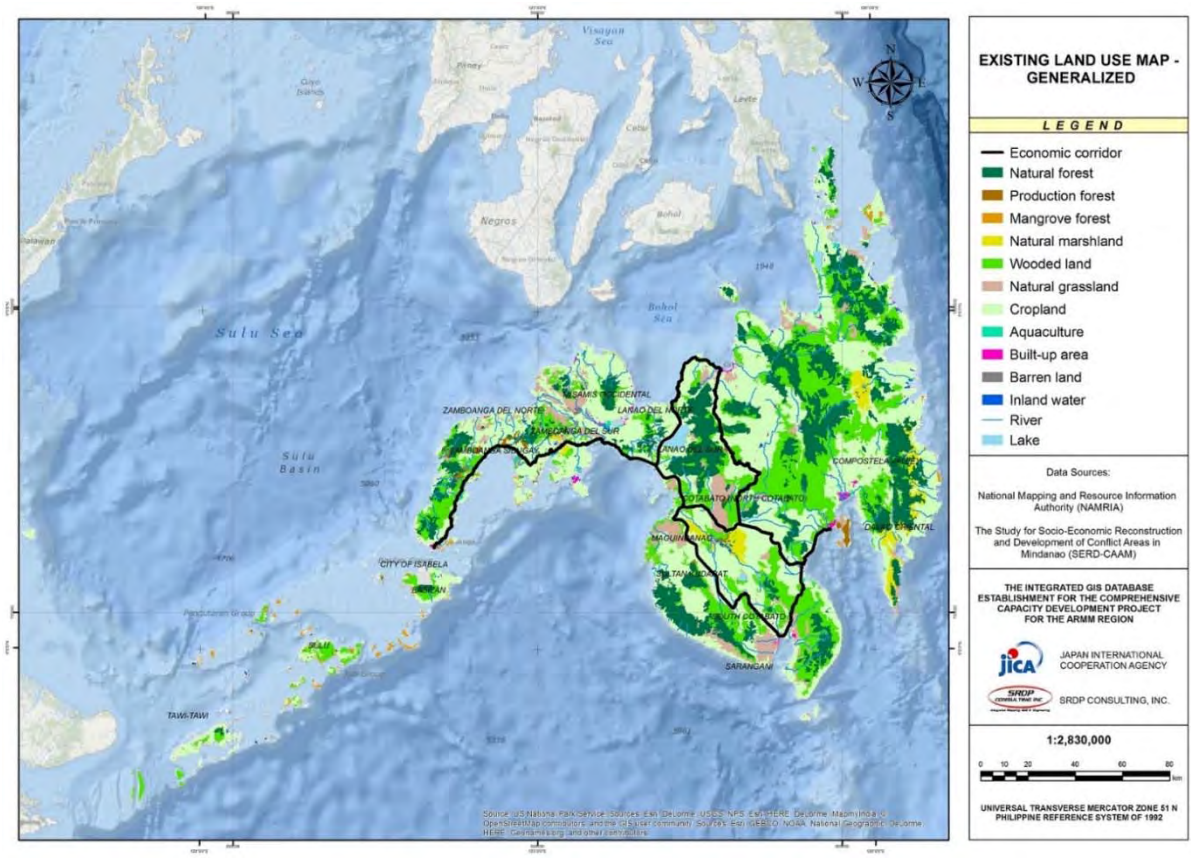


Figure 9.7 Generalized Existing Land Use Map

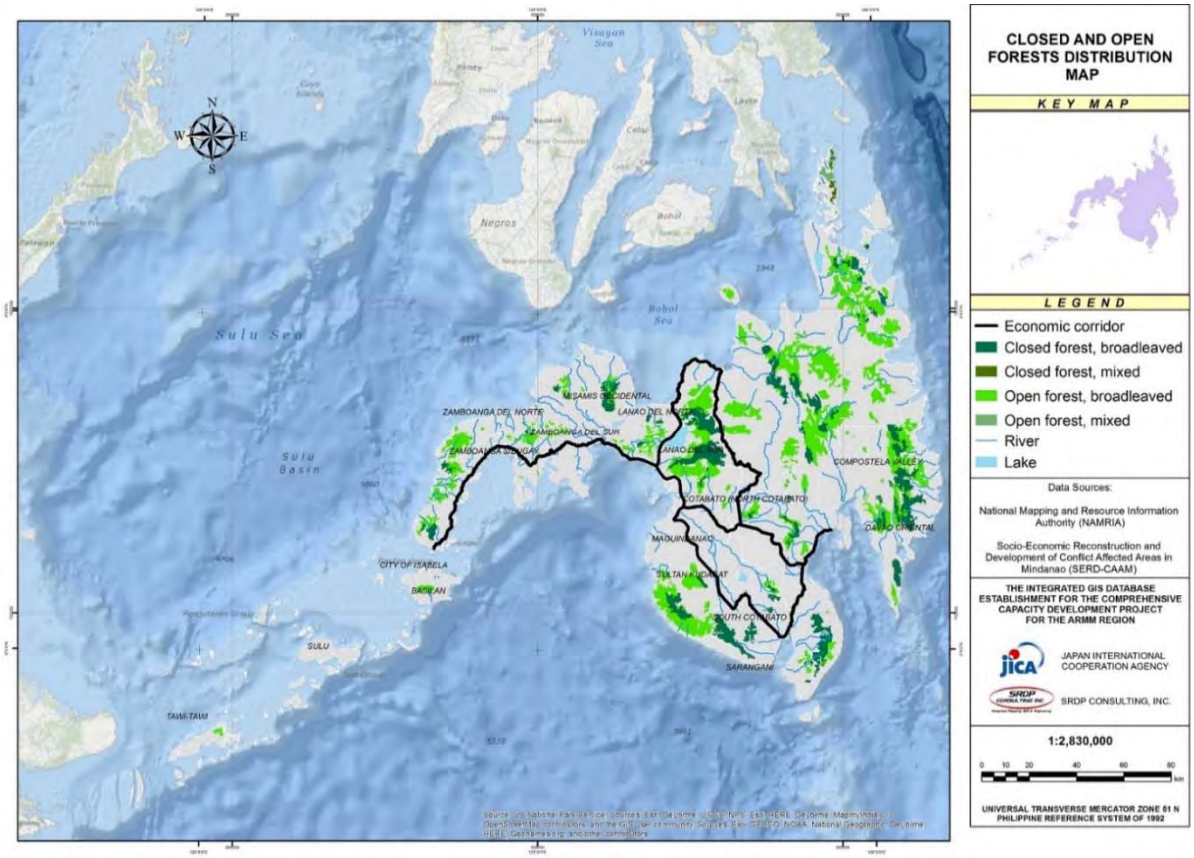


Figure 9.8 Open and Closed Forest Distribution Map

Table 9.11 Existing Land Use Areas by Province

		Province (Land Use Areas in Hectares)																													
Detail LU	General LU	ZAMBOANGA DEL NORTE	ZAMBOANGA DEL SUR	ZAMBOANGA SIBUGAY	CITY OF ISABELA	BUKIDNON	CAMIGUIN	LANAO DEL NORTE	MISAMIS OCCIDENTAL	MISAMIS ORIENTAL	DAVAO DEL NORTE	DAVAO DEL SUR	DAVAO ORIENTAL	COMPOSTELA VALLEY	COTABATO (NORTH COTABATO)	SOUTH COTABATO	SULTAN KUDARAT	SARANGANI	COTABATO CITY	BASILAN	LANAO DEL SUR	MAGUINDANAO	SULU	TAWI-TAWI	AGUSAN DEL NORTE	AGUSAN DEL SUR	SURIGAO DEL NORTE	SURIGAO DEL SUR	DINAGAT ISLANDS	
Closed forest, broadleaved	Natural forest	12,008.88	12,099.19	1,022.53		48,962.60		19,147.14	29,202.30	8,060.25	7,184.79	44,397.75	71,359.48	60,013.68	14,053.86	61,826.28	31,114.18	24,043.59			92,940.72	1,577.28			2,346.91	36,702.84	12,943.03	19,154.34	1,045.92	611,207.54
Closed forest, mixed	Natural forest																												10,187.69	10,187.69
Forest plantation, broadleaved	Production forest	2,956.37	436.11	21,910.62		414.69					15,182.85				5,587.67		685.62					1,413.65								48,587.58
Forest plantation, mangrove	Production forest																						773.02							773.02
Inland water	Inland water	185.82	5,475.04	690.84		1,088.77		771.44		97.89				394.41	4.57	2,342.16	8,374.11		370.50	261.04	1,105.21	3,886.54	959.25	1,531.82	990.45	1,338.33	381.76	6,710.10	206.22	37,166.27
Mangrove forest	Mangrove forest	2,360.59	3,932.23	10,765.33				712.61	1,431.72		1,319.44		4,253.56				27.42	123.85	755.47	6,154.68		212.25	28,635.37	1,022.80	122.31		9,826.57	2,304.51	613.08	74,573.79
Open forest, broadleaved	Natural forest	87,751.81	24,559.64	25,236.20		105,475.89	7,373.83	73,901.62	12,904.30	39,349.82	52,507.08	33,502.65	76,426.91	72,781.61	53,720.77	21,206.09	108,007.31	20,805.27		10,816.56	54,197.66	27,431.96		4,037.01	56,636.53	219,113.89	19,349.70	137,636.09	853.22	1,345,583.42
Open forest, mixed	Natural forest																										52.34		14,613.61	14,665.95
Other land, built-up area	Built-up area	1,521.63	10,171.71	713.52		1,051.97	240.37	4,948.06	1,580.99	7,320.50	8,253.95	9,080.27		1,161.22	766.08	5,930.48	1,133.74	2,313.69	1,040.04	280.27	1,358.97	384.26	360.27	479.78	1,361.09	633.05	608.07	1,099.90		63,793.88
Other land, cultivated, annual crop	Cropland	91,768.33	83,477.50	54,199.73	53.78	30,616.66	77.93	42,007.72	16,674.28	90,683.24	135,549.62	101,217.29	69,305.76	112,220.54	139,544.04	141,519.11	134,201.87	14,930.37	6,173.46	11,435.85	96,086.55	120,828.57	718.13	601.18	30,966.96	101,648.78	28,003.41	23,468.79	26,155.66	1,704,135.11
Other land, cultivated, perennial crop	Cropland	207,284.26	183,888.92	113,528.25	16.59	480,903.87	13,892.84	134,444.27	113,408.51	97,994.54	10,700.81	135,375.22	131,982.15	57,744.46	137,654.90	29,554.77	95,627.74	82,412.48	609.01	45,916.27	25,126.09	105,778.23	47,650.90	61,196.83	70,244.51	95,914.35	94,832.79	214,392.74	9,519.39	2,797,595.69
Other land, fishpond	Aquaculture	1,412.81	11,472.67	10,928.62				2,710.50	1,060.96	672.52	3,069.13	1,713.04	947.03				732.74	1,061.43	971.38	893.64		552.06			2,772.61		1,812.73	520.47		43,304.34
Other land, natural, barren land	Barren land	2,455.26	9,104.64	5,288.13																32.07	160.94	48.85	1,279.67	642.11			955.21			19,966.88
Other land, natural, grassland	Natural grassland	97,202.78	67,816.23	5,445.42	5.65	12,518.80		1,124.36		30,244.31	8,124.03	937.22	11,434.39	84.45	93,502.39	45,327.98	2,562.18	73,368.86	205.22	1,027.90	7,246.16	68,820.22	565.29	2,706.24	24,658.66	14,465.38	16,175.90	2,213.16	56.58	587,839.76
Other land, natural, marshland	Natural marshland		11,456.27	73.21									100,029.72	441.30	15,844.17		2,968.81		835.73			52,277.31				51,850.74		2,593.38		238,370.64
Other wooded land, fallow	Wooded land	6,254.43	388.94	47.70									1,738.79	101.96	188.72					984.73		5,622.98				4,385.71	215.30		67.81	19,997.07
Other wooded land, shrubs	Wooded land	47,400.12	50,090.45	1,308.21	0.17	36,974.15	1,597.88	9,665.40	8,613.35	28,250.54	1,692.85	29,350.64		19,985.09	31,972.40	22,261.05	6,470.59	46,711.36		30,146.12	17,805.38	3,046.58	372.06	4,129.05	11,879.25	97,530.97	9,716.18	5,049.48	12,852.29	534,871.61
Other wooded land, wooded grassland	Wooded land	65,490.05	44,049.40	32,400.62		175,874.40	861.89	30,152.11	2,369.16	27,651.08	108,000.34	241,284.03	5,159.80	126,544.49	138,722.92	106,173.62	65,142.95	65,185.11		330.12	17,779.42	87,047.94	57,753.33	23,650.19	91,410.44	173,085.63	5,493.93	90,091.27	2,659.45	1,784,363.69
Unclassified	Unclassified	1,088.50	2,773.74	1,873.01	21,533.50		236.74	309.32	1,288.80	342.71	413.95	645.22	1,822.67	150.84		57.28	179.45	345.63	112.65	6,048.79	89.29	521.49	9,206.47	15,602.37	99.64	-	2,227.66	3,009.88	896.01	70,875.61
Grand Total		627,141.64	521,192.68	285,431.94	21,609.69	893,881.80	24,281.48	319,894.55	188,534.37	330,667.40	351,998.84	597,503.33	474,460.26	451,624.05	631,562.49	436,198.82	457,228.71	331,301.64	11,073.46	114,328.04	313,896.39	479,450.17	148,273.76	115,599.38	293,489.36	796,669.67	202,594.58	508,244.11	79,726.93	10,007,859.54

Table 9.12 Existing Open and Closed Forests Distribution by Province

		Area in Ha																													
	Geocode	097200000	097300000	098300000	099700000	101300000	101800000	103500000	104200000	104300000	112300000	112400000	112500000	118200000	124700000	126300000	126500000	128000000	129800000	150700000	153600000	153800000	156600000	157000000	160200000	160300000	166700000	166800000	168500000	Unknown	Grand Total
Detail LU	General LU	ZAMBOANGA DEL NORTE	ZAMBOANGA DEL SUR	ZAMBOANGA SIBUGAY	CITY OF ISABELA	BUKIDNON	CAMIGUIN	LANAO DEL NORTE	MISAMIS OCCIDENTAL	MISAMIS ORIENTAL	DAVAO DEL NORTE	DAVAO DEL SUR	DAVAO ORIENTAL	COMPOSTELA VALLEY	COTABATO (NORTH COTABATO)	SOUTH COTABATO	SULTAN KUDARAT	SARANGANI	COTABATO CITY	BASILAN	LANAO DEL SUR	MAGUINDANAO	SULU	TAWI-TAWI	AGUSAN DEL NORTE	AGUSAN DEL SUR	SURIGAO DEL NORTE	SURIGAO DEL SUR	DINAGAT ISLANDS		
Closed forest, broadleaved	Natural forest	12,008.88	12,099.19	1,022.53		48,962.60		19,147.14	29,202.30	8,060.25	7,184.79	44,397.75	71,359.48	60,013.68	14,053.86	61,826.28	31,114.18	24,043.59			92,940.72	1,577.28			2,346.91	36,702.84	12,943.03	19,154.34	1,045.92	128.43	611,335.97
Closed forest, mixed	Natural forest																												10,187.69	21.64	10,209.33
Open forest, broadleaved	Natural forest	87,751.81	24,559.64	25,236.20		105,475.89	7,373.83	73,901.62	12,904.30	39,349.82	52,507.08	33,502.65	76,426.91	72,781.61	53,720.77	21,206.09	108,007.31	20,805.27		10,816.56	54,197.66	27,431.96		4,037.01	56,636.53	219,113.89	19,349.70	137,636.09	853.22	192.53	1,345,775.95
Open forest, mixed	Natural forest																										52.34		14,613.61	90.10	14,756.05
Grand Total		99,760.69	36,658.83	26,258.73	-	154,438.49	7,373.83	93,048.76	42,106.60	47,410.07	59,691.87	77,900.40	147,786.39	132,795.29	67,774.63	83,032.37	139,121.49	44,848.86	-	10,816.56	147,138.38	29,009.24	-	4,037.01	58,983.44	255,816.73	32,345.07	156,790.43	26,700.44	432.70	1,982,077.30

(3) Evaluation of land potential

The eleven crop suitability maps collected from the Department of Agriculture (DA) cover the entire Philippines. Table 9.13 lists these agro-edaphic suitability (AES) groupings. Figure 9.9 shows a sample crop suitability map. Based on these, a composite land suitability map is constructed with the following suitability groups: (1) not suitable, (2) production forest, (3) tree crop-based farming, (4) plantation, (5) multi-crop, (6) aquaculture as shown in Figure 9.10.

Table 9.13 Commodity Aggregation of Crop Suitability Maps

Agro-edaphic suitability grouping	Commodities/Crops	Generalized classification
AES-1	Paddy rice, irrigated and non-irrigated	Paddy field
AES-2	Upland rice, corn, sorghum, peanut, pineapple	Field crop
AES-3	Baguio beans, cabbage, white potato, carrot, lettuce	Field crop
AES-4	Ginger, garlic, onion, cucumber	Field crop
AES-5	Cotton, tobacco, sugarcane	Plantation
AES-6	Coconut, oil palm, banana, abaca, coffee (robusta)	Plantation
AES-7	Mango, cashew, papaya, santol, tamarind, atis	Tree crop-based farming
AES-8	Durian, marang, lanzones, rambutan, avocado	Tree crop-based farming
AES-9	Bamboo, ipil-ipil, paragrass, pasture, jatropha	Production forest
AES-10	Coffee (Arabica), tea, black pepper	Plantation
AES-11	Aquaculture (fishpond)	Aquaculture

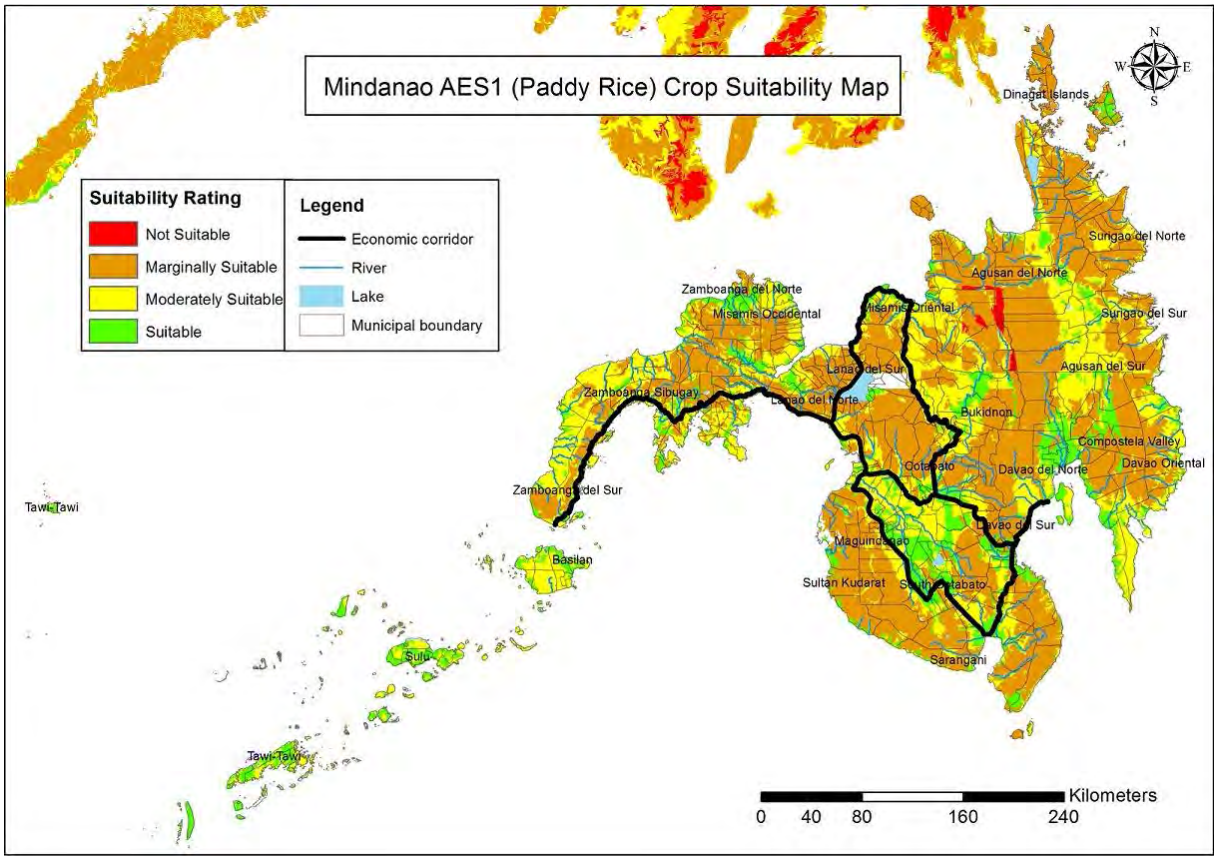


Figure 9.9 Sample Individual Crop/Commodity (Rice) Suitability Map

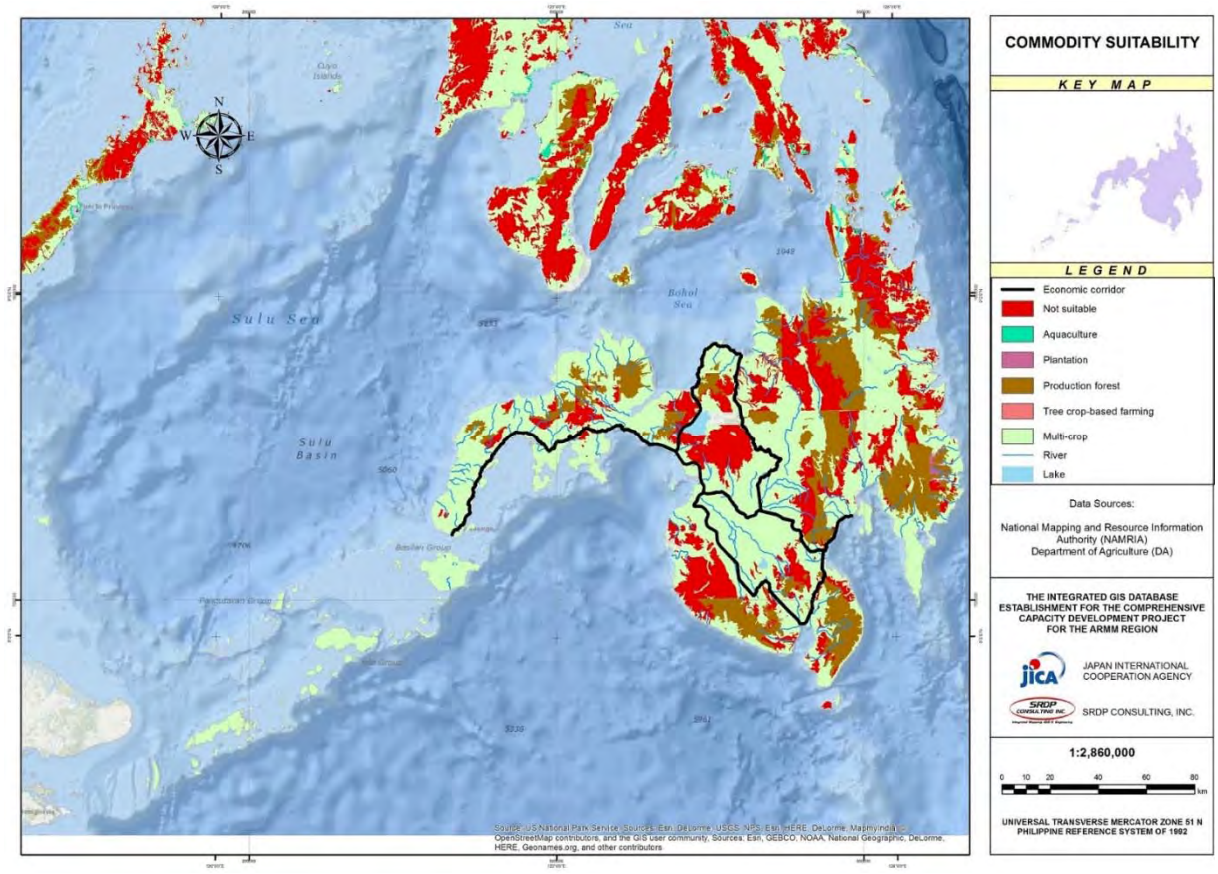


Figure 9.10 Integrated Crop/Commodity Suitability Map

(4) Land use planning

To construct a future land use map, a land use conversion matrix is prepared to define future land use based on the existing land use and the land suitability. The following considerations are reflected in formulating the land use conversion matrix:

1) Natural forests, marshland, and inland water areas should be preserved.
2) Available land for conversion should give priority to agricultural uses using the Department of Agriculture's recommended crop/commodity suitability maps.
3) Existing built-up areas should be maintained.
4) Existing barren land, cropland, wooded land, and grassland are considered to be land available for conversion.

Given these considerations, the land conversion matrix has been prepared as shown in Table 9.14. By applying the land use conversion matrix, the future land use is planned in an indicative way as shown in Figure 9.11. Future land use by province is tabulated in Table 9.15.

Table 9.14 Land Use Conversion Matrix

		Suitable Land Use (Crop Suitability)							
Detailed Existing Land Cover	**Generalized Existing Land Cover**	**Aquaculture**	**Field Crops**	**Paddy Field**	**Plantation**	**Production Forest**	**Tree Crop Based Farming**	**Multi-crop**	**Not Suitable**
Closed forest, broadleaved	Natural forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest
Closed forest, mixed		Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest
Open forest, broadleaved		Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest
Open forest, mixed		Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest	Natural Forest
Forest plantation, broadleaved	Production forest	Aquaculture	Field Crops	Paddy Field	Plantation	Production Forest	Tree Crop Based Farming	Multi-crop	Production Forest
Forest plantation, mangrove		Aquaculture	Field Crops	Paddy Field	Plantation	Production Forest	Tree Crop Based Farming	Multi-crop	Production Forest
Mangrove forest	Mangrove forest	Mangrove forest	Mangrove forest	Mangrove forest	Mangrove forest	Mangrove forest	Mangrove forest	Mangrove forest	Mangrove forest
Other land, natural, marshland	Natural marshland	Marshland	Marshland	Marshland	Marshland	Marshland	Marshland	Marshland	Marshland
Other wooded land, fallow	Wooded land	Aquaculture	Field Crops	Paddy Field	Plantation	Production Forest	Tree Crop Based Farming	Multi-crop	Other
Other wooded land, shrubs		Aquaculture	Field Crops	Paddy Field	Plantation	Production Forest	Tree Crop Based Farming	Multi-crop	Other
Other wooded land, wooded grassland		Aquaculture	Field Crops	Paddy Field	Plantation	Production Forest	Tree Crop Based Farming	Multi-crop	Other
Other land, natural, grassland	Natural grassland	Aquaculture	Field Crops	Paddy Field	Plantation	Production Forest	Tree Crop Based Farming	Multi-crop	Other
Other land, cultivated, annual crop	Cropland	Aquaculture	Field Crops	Paddy Field	Plantation	Production Forest	Tree Crop Based Farming	Multi-crop	Other
Other land, cultivated, perennial crop		Aquaculture	Field Crops	Paddy Field	Plantation	Production Forest	Tree Crop Based Farming	Multi-crop	Other
Other land, fishpond	Aquaculture	Aquaculture	Field Crops	Paddy Field	Plantation	Production Forest	Tree Crop Based Farming	Multi-crop	Other
Other land, built-up area	Built-up area	Built-up area	Built-up area	Built-up area	Built-up area	Built-up area	Built-up area	Built-up area	Built-up area
Other land, natural, barren land	Barren land	Aquaculture	Field Crops	Paddy Field	Plantation	Production Forest	Tree Crop Based Farming	Multi-crop	Other
Inland water	Inland water	Inland water	Inland water	Inland water	Inland water	Inland water	Inland water	Inland water	Inland water

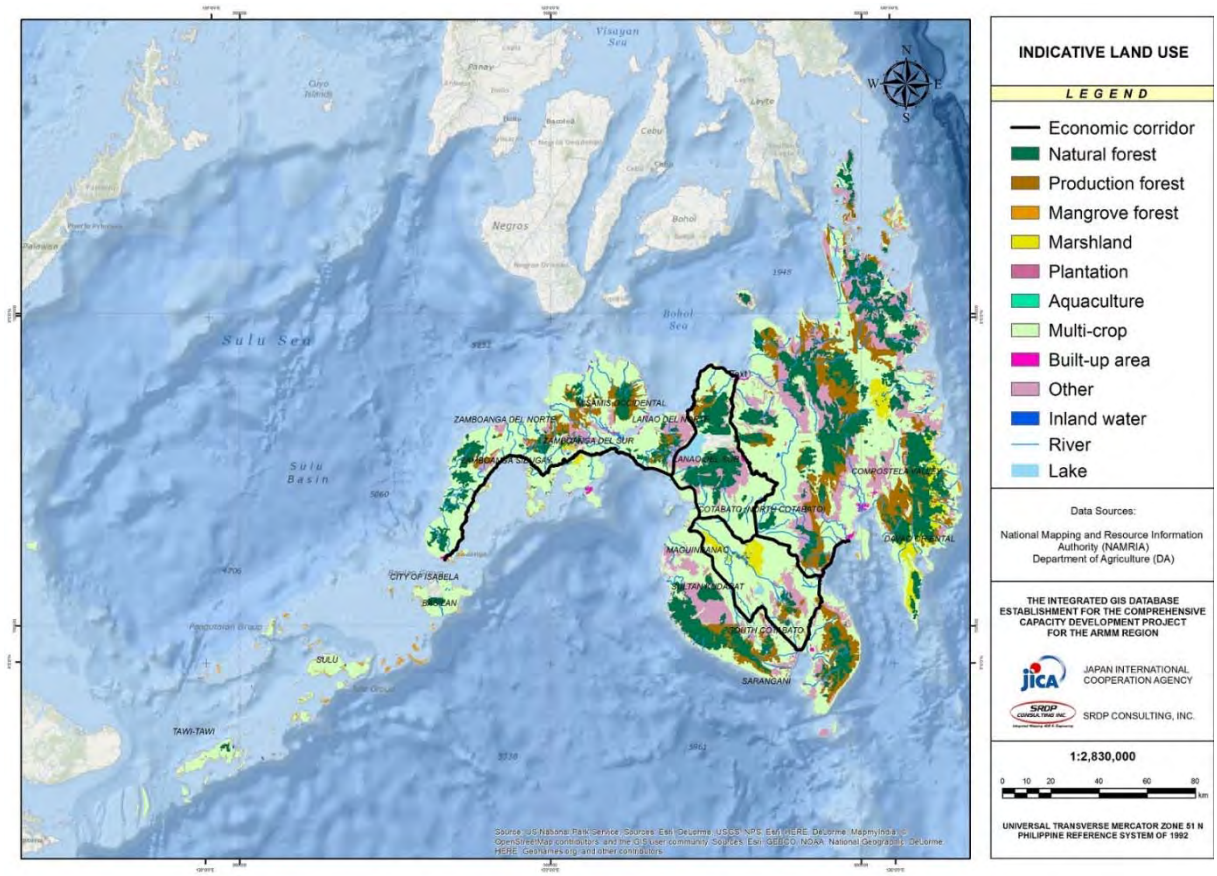


Figure 9.11 Indicative Land Use Planning Map

Table 9.15 Future Land Use Areas by Province

	Area in ha																												
	097200000	097300000	098300000	099700000	101300000	101800000	103500000	104200000	104300000	112300000	112400000	112500000	118200000	124700000	126300000	126500000	128000000	129800000	150700000	153600000	153800000	156600000	157000000	160200000	160300000	166700000	166800000	168500000	Unknown	Grand Total
Indicative LU	ZAMBOANGA DEL NORTE	ZAMBOANGA DEL SUR	ZAMBOANGA SIBUGAY	CITY OF ISABELA	BUKIDNON	CAMIGUIN	LANAO DEL NORTE	MISAMIS OCCIDENTAL	MISAMIS ORIENTAL	DAVAO DEL NORTE	DAVAO DEL SUR	DAVAO ORIENTAL	COMPOSTELA VALLEY	COTABATO (NORTH COTABATO)	SOUTH COTABATO	SULTAN KUDARAT	SARANGANI	COTABATO CITY	BASILAN	LANAO DEL SUR	MAGUINDANAO	SULU	TAWI-TAWI	AGUSAN DEL NORTE	AGUSAN DEL SUR	SURIGAO DEL NORTE	SURIGAO DEL SUR	DINAGAT ISLANDS		
Aquaculture						6.25																		143.75		1352.48		520.21	14.81	2037.5
						75																		593.58		2748.78		269.37	63.27	3750
																								1136.39		887.5			1.11	2025
																										48.63			1.37	50
						21.64																				1136.74		80.06	67.81	1306.25
									30.72																				0.53	31.25
Built-up area		156.25	6.25		39.04	74.41	6.25		118.75	306.77	193.75		105.73		143.75		256.25			817.21	12.5						162.45		0.64	2400
						18.75																		6.25		129.41			1.84	156.25
							256.32	37.5	6.18				81.25		12.5										300					693.75
	1506.47	9544.71	718.75		1043.59	85.79	1438.37	1414.59	6944.56	7456.45	7807.79		1024.75	775	5406.82	1101.81	2000	1011.54	281.15	498.94	332.14	334.09	512.5	1070.59	312.5	381.81	725		376.54	54106.25
Inland water							269.45								468.75					70.7						146.88	1135.75	162.5	145.97	2400
																								56.25						56.25
							175						356.25		281.25									69.47		5.31		62.5	137.72	1087.5
	122.32	4427.71	540.63		1112.5		270.71		75				31.25	5.88	1650.69	3674.48		282.79	201.68	116.17	3600.59	602.33	1112.98	651.81	1418.75	75.94	3885.46		777.83	24637.5
Mangrove forest	106.25	12.66	21.98							12.5								49.47								265.23	560.59	56.25	65.07	1150
																										2557.21			180.29	2737.5
								43.75				12.5														4.22			2.03	62.5
	2123.29	2212.86	8401.89				718.75	1147.28		1186.6		3689.56				34.7	118.44	385.43	4587.51		115.7	22355.36	668.84	57.89		4446.75	1062.31	470.64	3103.7	56887.5
Marshland		7406.25										2718.75				209.45					9.3									10343.75
												7331.25																		7331.25
												18210.74	433.01												650					19293.75
		3929.55	45.45									71399.36		15836.16		2656.02		837.88			51682.44				50450		2535.76		189.88	199562.5
Multicrop	2899.7	137.5	14730.83		300					14539.74				5366.88		776.92					881.2								48.48	39681.25
																						712.5								712.5
	83930.73	59956.56	53365.44	48.13	14004.1	50	20112.48	12972.4	62277.5	93728.84	93403.74	44371.54	76014.68	130317.74	128384.78	109942.29	12913.2	5621.95	11410.19	39740.37	113651.09	580.06	592.68	23623.54	89821.1	20085.29	19991.96	11774.54	1426.01	1334112.93
	191369.5	166528.37	94866.93	8.53	366389.93	8557.73	98008.37	91299.41	72738.5	7794.79	64822.23	101278.3	30320.05	115232.7	4151.65	27825.44	63605.1	572.71	44499.91	17871.27	75056.37	44948.34	52010.35	42514.51	52476.11	41760.19	122754.21	856.13	6413.69	2006531.32
	1193.18	10332.06	9757.41				2468.72	843.4	606.63	2945.96	1402.81	600				701.77	530.12	775.58	747.55		539.3			1237.5		87.5	431.19		568.08	35768.76
	2060.38	5812.5	4576.95																6.25		6.25	662.06	310.1			25			296.76	13756.25
	79909.18	33302.96	4979.35	7.14	10809.77		249.03		24306.93	7904.4	875.5	10498.4		81376.12	25432.42	2425.43	41500.22		936.86	3852.15	5636.1	370.02	1742.97	6170.42	72.22	1677.17	1357.43	19.01	1148.81	397300.01
	3437.65	306.07										1493.19	48.99	209.54					986.66		4261.88				3437.5	178.21		18.62	27.94	14406.25
	42473.21	46569.45	16.12	5.62	26779.99	1196.23	7641.37	1213.13	13683.32	1058.03	23956.65		7416	28193.3	10226.7	289.72	31415.72		29996.39	2569.17	2881.25	374.88	3543.06	4673.39	13701.5	1317.73	332.92	5142.73	507.52	307175.1
	39230.49	31208.86	26387.44		136307.54	355.15	14298.4	1082.55	12831.16	28614.6	63083.6	3764.15	50892.94	95918.15	55032.86	22980.01	21165.52		331.25	3628.5	60947.83	55287.27	22043.25	18870.15	50961.14		35578.36	6.25	1299.12	852106.54
Natural forest		2368.75	187.5		34055.17		3940.75		7949.26	4594.35	1692.09	6576.55	2048.45	10515.57	5263	26807.1	4346.95			76590.69	1350.07			2373.46	28397.76	11282.46	13481.48	906.25	22.35	244750.01
												3968.87	174.88																	4143.75
	5027.64	6.16	716.2		8413.85		2034.53	29200	25	2716.42	42029.93	37635.61	50947.98	807.41	54176.13	3386.38	18606.4			771.72					6948.7	1206.25			0	264656.31
	6929.11	9651.93	118.96		5802.09		11523.53	18.75	127.59	62.5	1029.09	23826.11	6735.53	2571.13	2412.5	693.75	837.28			7221.79	243.75				1273.36	195.78	5932.45	84.45	171.07	87462.5
																												6557.89	17.11	6575
																												425		425
																												3241.02	27.73	3268.75
	992.77	8675.03	7563.45		37832.29	7150	21251.57		15118.91	12278.1	2222.06	640.41	10341.41	36198.72	3003.69	81348.63	3731.9			31147.14	25592.6			50671.46	65090.48	18370.84	102573.03		61.8	541856.29
												3881.26	131.24																	4012.5
	25385.61	219.79	438.34		34813.12		39518.17	12368.75	10192.86	39553.47	31476.66	33758.9	58122.37	106.23	16804.78	2098.93	10694.64			1058.83				5179.83	102258.08	362.5	4894.3	443.75	0.14	429750.05
	60765.44	16281.79	17284.63		32648.58	231.25	12882.63	468.75	13816.71	876.94	137.5	38678.05	3107.32	17685.27	1120.81	24402.72	6542.86		10787.5	7864.87	2087.35		4031.25	718.17	51338.7	581.25	30215.87	416.31	58.75	355031.27
																												3089.64	22.86	3112.5
																										9.73		381.25	2.77	393.75
																												10875.77	92.98	10968.75
Other	713.07	11363.85			14418.48		13435.83	85.58	7951.17	36493.03	4288.74	4637.5	17210.9	9246.08	6847.05	22651.37	881.88	0.04		49364.02	5180.46			500	1468.3	3699.36	2844.91	9896.73	97.13	223275.48
	6430.49	9976.6	11706.25		96363.91	4926.97	13143.35		12772.03	1862.04	21410.64	10523.31	16146.12	21900.24	3623.94	65907.35	12584.24			5512.44	27054.98			8559.07	15340.29	35449.39	80423.42	4338.8	700.45	486656.32
	156.25										300						431.25									497.96	30.01		3.28	1418.75
	268.75	1206.25	450																							463.81			4.94	2393.75
	2126.49	18322.41			390.4				133.92		5.72	118.75		12277.5	5095.08	206.25	15849.07			569.86	9333.89			4163.3	10862.37	1400.48	773.17		65.08	81693.74
	687.5	11.7																			181.25				456.25	24.62			1.18	1362.5
	150	4043.75			10159.61	325	0.95		5798.97	498.87	2200.11		2177.16	2938.88	1654.09	5783.41	6618.71			13832.01	143.75			4333.17	30250.63	3805.26	4335.91	6745.73	47.78	105843.75
	3037.36	12074.82	4012.5		25552.41	498.52	6847.5	0.32	6774.52	41304.38	53378.45		7494.21	41912.63	24272.19	40758.58	9488.91			11051.72	14453.46			45675.9	43083.4	2673.86	52982.51	25	15.59	447368.74
												631.25																		631.25
Plantation												1775																		1775
												131.25																		131.25
Production forest		306.25	6381.25																		681.25									7368.75
			893.75																											893.75
	6460.49	11401.36			2536.93		7983.59	3581.51	20049.83	3256.24	2937.5	14883.64	18853.87		6918.61	1125.14	325			912.87				5342.99	9692.53	1723.32	125	2223.37	59.97	120393.76
	6064.01	1286.23	5294.5		18564.61		18363.89	21572.99	10927.77		45042.82	13737.5	11181.25		21652.05	1211.86	1367.34			58.6				14743.75	27717.5	9685.67	3657.52	2288.55	175.37	234593.78
		2106.25	87.5																							56.25				2250
	14473.32	15989.87	543.06		1287.5		900		5576.34		44.84		87.5		13788.71		16585.2							13292.4	3518.75	10761.26			38.75	96887.5
	2106.25		43.75										43.75												562.5					2756.25
	3811.71		1357.04		48.41		1731.25	7412.5	8752.1		2563.8		10481.25	781.69	10617.95	313.3	8542.01			2.39				2352.82	53564.76	2430.92	252.33	300	52.52	115368.75
	22578.38	938.65	1035.02		13328.36		7768.2	1322.95	7670.96	37992.71	125234.61	1114.36	68544.85	12.9	27125.81	858.27	34827.78			23.68				25983.55	78123.38	1855.42	894.15	1486.35	54.66	458775
Unclassified	8600.44	12737.51	7858.87	21539.77	771.08	708.29	12095.31	2444.1	3403	4921.85	5898.55	11751.63	473.16	44.72	619.11	6992.43	5527.94	1535.82	9541.89	38742.24	22769.23	22043.33	27649.71	8717.61	3103.64	16735.59	14267.63	6560.6	1124292.68	1402347.73
Grand Total	627127.43	520813.27	284387.99	21609.19	893773.26	24280.98	319334.27	188530.21	330660.19	351959.58	597439.18	473637.69	451028.1	630230.44	436187.67	457163.51	331293.93	11073.21	114314.79	313889.35	479425.98	148270.24	114217.69	293482.97	796652.2	202589.96	508197.08	79725.27	1142953.76	11144249.39

CHAPTER 10 BANGSAMORO DEVELOPMENT PLAN

10.1 Structure of Bangsamoro Development Plan

10.1.1 Transition from BDP I

(1) Broad-based inclusive development

The Bangsamoro Development Plan Phase 1 (BDP I) was prepared by engaging local consultants supported by JICA and other donors. The Bangsamoro Development Agency (BDA) has elaborated the development plan for the transition period of 2014–16, under the guidance of OPAPP, NEDA, and other national agencies, and the integrative report was compiled in November 2014. The report was reviewed by the JST, and it has been further elaborated for early implementation. It was finally published in May 2015.

As part of the efforts, BDP program prioritization workshops were held by the BDP Core Planning Team in Manila and Cotabato City on January 21–22 and 28–29, 2015, respectively. The results were presented at a workshop organized with national line agencies on February 20, 2015, where BDA presented the BDP Priority Programs and Projects (Phase 1).

The Bangsamoro Development Plan being prepared at this time is the continuation and extension of efforts for the BDP I, which serves as the point of departure for the JICA Study to prepare useful materials for the BDP through the year 2022. Specifically, the workshop in February has established a short list of strategic 2015 projects that should be implemented immediately to build confidence and assuage fears among the Bangsamoro communities toward the passage of the Bangsamoro Basic Law.

Implementation of the BDP Priority Programs and Projects (Phase 1) will prepare ground works for the BDP in the subsequent stage. In particular, the BDP priority programs for 2015 consist of the following:

1) Livelihood support and training particularly in agriculture and fishery,
2) Improvement of education including adult and IP education,
3) Water, sanitation and hygiene (WASH),
4) Electrification with solar panels,
5) Construction of farm-to-market roads and construction/rehabilitation of small-scale irrigation,
6) Bangsamoro cultural heritage program,
7) Improvement of health services including immunization and supplemental feeding,
8) Forest and watershed rehabilitation and capacity development for disaster risk reduction and management (DRRM), and
9) Awareness and confidence building campaign.

These programs are expected to continue to be implemented in 2016 and beyond with extension. They are very much in line with one of the key concepts proposed for the BDP through 2022 and beyond: Broad-based inclusive development.

(2) Other important concepts for BDP through 2022 and beyond

Broad-based inclusive development will be pursued throughout the BDP, starting from the BDP Priority Programs and Projects (Phase 1) and continued by the Bangsamoro Development Plan through 2022 and beyond. Other key concepts presented in Chapter 9 will be pursued within the structure shown in Figure 9.2.

Alternative socio-economy on tradition is the main theme of the Bangsamoro development, which pursues utilization of indigenous resources by, and for the benefit of local people. **Agro-based industrial clusters** present the most effective tool to substantiate this idea. **Mixed ethnicity for diversity** is another favorable condition to support the alternative socio-economy as it is a source of traditional skills and wisdom as well as socio-economic dynamism. **Resilient and robust society** is

realized based on such socio-economic diversity. It is robust against external forces of global market and resilient or bouncing back from adverse effects.

Outward oriented development is another key for Bangsamoro to realize rapid development, taking advantage of its strategic position in relation to neighboring regions and countries. It is characterized by production for export market, and as such complementary to the idea of agro-based industrial clusters linking livelihood activities by people, through indigenous industries to export industries.

Good governance is naturally a prerequisite to realizing the Bangsamoro development as planned by concerted efforts of all the stakeholders. **Organizational strength with unity** among all the stakeholders is realized under such good governance with accountability, responsiveness and transparency. Participation of people in development planning and implementation is the key for realizing these ideas.

Natural resources management is properly undertaken by good governance to utilize rich natural resources in such a way to support the alternative socio-economy. **Self-reliant regional development** of Bangsamoro will be realized based on alternative socio-economy on tradition, outward oriented development and good governance.

10.1.2 Structure of Bangsamoro Development Plan

(1) Development with four initiatives

The Bangsamoro Development Plan presented in this chapter consists of development programs and projects structured into four initiatives and associated institutional measures. The four initiatives are: I. Broad-based Inclusive Development Initiative, II. Concerted Pump Prime Initiative, III. Alternative Socio-economy Promotion Initiative, and IV. Enhanced Resources Management Initiative. Programs and projects comprising each initiative are described in the subsequent sections (10.2–10.5), followed by institutional measures (10.6).

As the BDP is expected to support the peace-building through conflict resolution and alleviation of conditions to cause conflicts, support strategy and measures for peace-building are highlighted based on the proposed programs, projects and institutional measures (10.7). Also, the Bangsamoro development scenario is outlined to provide an overview of how Bangsamoro will be transformed in steps to attain the development objectives (10.8).

I. Broad-based Inclusive Development Initiative

This initiative is basically the continuation and extension of the BDP 1. As listed above, it consists of projects responding to the imminent needs of the people for various social services and livelihood activities. Immediate implementation of these projects will prepare the people to pursue more self-reliant socio-economic activities in the subsequent phase. Most projects under this initiative will continue to be implemented through 2022.

II. Concerted Pump Prime Initiative

Given the gaps existing in socio-economic conditions in Bangsamoro and the rest of the Country, rapid development of Bangsamoro to catch up with the national average at least is expected. This initiative responds to such demands. It will take more than just a jumpstart for Bangsamoro to catch up with the rest of the Country. This initiative will facilitate the rapid development to be sustained by concerted efforts of people supported by the governments and donors.

III. Alternative Socio-economy Promotion Initiative

This initiative pursues the main theme of the Bangsamoro development by encouraging effective use of indigenous resources for new economic activities. Projects under this initiative include those to improve and extend the existing economic activities such as integrated and mixed farming, and those to introduce innovative economic activities such as industrial clusters and halal industry. While it will take time to establish these activities fully, support measures should start to be implemented immediately.

IV. Enhanced Resources Management Initiative

This initiative will enhance the resource capacity of Bangsamoro and improve the resource management by community involvement to support sustainable development. Most projects under this initiative should also start to be implemented immediately. As it has long lasting effects, however, some of proposed projects should be further examined for their effects on social and natural environment as well as investment requirements, while some other projects are partly implemented.

(2) Development vision with alternative socio-economy and outward oriented development

The Bangsamoro development should be pursued with the idea of alternative socio-economy. Also, outward oriented development should be pursued to take advantage of its strategic location in relation to neighboring regions and countries. The idea of alternative socio-economy, however, cannot be introduced fully from the beginning as it will take time to establish institutions supporting it. Outward oriented development should be pursued carefully to avoid social and environmental repercussions.

To pursue self-reliant regional development with any development model, necessary conditions are to provide basic services such as basic education and preventive health care and empower residents. Another way to empower the residents is to support their livelihood activities by guidance, technical extension and skill training. These necessary conditions should be satisfied as a matter of urgency. The projects and programs proposed by the BDP 1 meet these requirements, and they should continue to be implemented under the Broad-based Inclusive Development Initiative.

The Bangsamoro socio-economy is expected to develop rapidly to narrow the existing gaps with the national averages. For this purpose, first existing initiatives by the private sector should be effectively utilized, second currently underutilized resources should be mobilized with priority, and third key infrastructure should be improved or upgraded strategically. All of them will provide driving forces for outward oriented development. These activities will be carried out under the Concerted Pump Prime Initiative.

While the necessary conditions for self-reliant regional development are being satisfied, and strategic resources utilization and infrastructure development are undertaken, most residents should start to prepare for new livelihood activities in line with alternative socio-economy. Specifically, activities of mixed and integrated farming and industrial clusters based on primary products are considered important livelihood and economic activities in Bangsamoro. These activities are supported by the projects and programs proposed under the Alternative Socio-economy Promotion Initiative.

To make the regional development sustainable, resource capacity of the Region should be enhanced, and resources management should be undertaken by responsive and transparent governance system with participation of local people and communities. This applies particularly to water and related land resources with forests. The projects and programs proposed under the Enhanced Resources Management Initiative respond to these requirements.

(3) Anchor projects

The Bangsamoro development plan is composed of 54 projects in 16 programs under four initiatives. Of the long list of the projects, 27 projects are earmarked as anchor projects. These are projects that characterize the Bangsamoro development throughout the three phases. They have been selected on the basis of the following criteria and considerations:

a) Projects have well defined characteristics consistent with the Bangsamoro development objectives, strategy and vision.

b) Projects will establish alternative systems for production, marketing or service delivery.

c) Projects have strategic importance in transforming the spatial and socio-economic structure of the Bangsamoro.

d) Projects have broad coverage of people in specific segments of the society to improve their livelihood.

The following anchor projects have been selected.

1) Agricultural cooperatives empowerment project
2) Labor based road rehabilitation and maintenance project
3) Abubakar integrated area development project
4) Artery roads upgrading project
5) Polloc port upgrading project
6) Awang airport improvement project
7) Greater Cotabato City urban infrastructure development project
8) Jolo and Bongao urban functions upgrading project
9) Communal irrigation (CISs) support project
10) Bangsamoro economic corridor development project
11) Polloc port and ecozone development project
12) Special employment zone development project
13) Abaca industrial cluster development project
14) Coco and sugar industrial cluster development project
15) Goat-based integrated farming project
16) Mixed field crops farming project
17) Open pollinated seed production center establishment
18) Halal industry promotion project
19) Open market establishment project
20) Cold chain facilities installation project
21) Marine culture development project
22) National greening program enhancement project
23) Community-based forest management project
24) Community based coastal resources management project
25) Mini hydro power development project
26) Small-scale irrigation crop intensification project
27) Mindanao River basin integrated watershed and flood management project

Coverage of provinces by the anchor projects is summarized in Table 10.1. The anchor projects are designated by asterisk (*) at the end of their titles.

Table 10.1 Coverage of Provinces by Selected Anchor Projects

Anchor projects	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi
1) Agricultural cooperatives empowerment project	√	√	√	√	√
2) Labor based road rehabilitation and maintenance project	√	√	√	√	√
3) Abubakar integrated area development project	√	√			
4) Artery roads upgrading project	√	√	√	√	√
5) Polloc port upgrading project	√				
6) Awang Airport improvement project	√				
7) Greater Cotabato City urban infrastructure development project	√				
8) Jolo and Bongao urban functions upgrading project				√	√
9) Communal irrigation support project	√	√	√	√	√
10) Bangsamoro economic corridor development project	√	√			
11) Polloc port and ecozone development project	√				
12) Special employment zone development project			√	√	√
13) Abaca industrial cluster development project	√	√	√	√	
14) Coco coir and sugar industrial cluster development	√		√	√	

Anchor projects	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi
15) Goat-based integrated farming project	√			√	√
16) Mixed field crops farming project	√	√	√	√	√
17) Open pollinated seed production center establishment	√	√	√	√	√
18) Halal industry promotion project	√	√	√	√	√
19) Open market establishment project	√	√			
20) Cold chain facilities installation project	√	√	√	√	√
21) Marine culture development project			√	√	√
22) National greening program enhancement project	√	√	√	√	√
23) Community-based forest management project	√	√	√	√	√
24) Community based coastal resources management project	√	√	√	√	√
25) Mini hydro power development project	√		√	√	
26) Small-scale irrigation crop intensification project	√	√	√	√	√
27) Mindanao River Basin integrated watershed and flood management project	√				

10.2 Broad-based Inclusive Development Initiative

This initiative is the continuation and extension of the BDP I. In particular, the BDP priority programs for 2015 cover skill training, social services and community infrastructure. These aspects are not directly covered by the present JICA Study, which focuses on agriculture, agro-industry, fishery and related industry, logistic infrastructure including road network, ports and airports, and power supply and flood control. Elements of the BDP 1 related to these sectors are incorporated in projects under other initiatives. Additional projects are proposed below.

10.2.1 Agrarian reform communities (ARCs) strengthening project

The Comprehensive Agrarian Reform Law (CARL) was passed building on the previous experiences of the Philippines from PD 27 and previous issuances. It led to the establishment of the Comprehensive Agrarian Reform Program (CARP), which sought to cover all types of agricultural lands with corresponding support services for the agrarian reform beneficiaries (ARBs) who are tenant-turned landowners. Much to the desire of the Government, funds were not enough to support all agrarian reform communities (ARCs).

The lack of adequate infrastructure, which made agriculture difficult for large landowners, made farming even more difficult for the new landowners who do not possess capital. Some lands under temporary crops fail cropping while underinvestment has made productivity decrease drastically. Having been tenants of the land they till, the new landowners do not have the enterprising nature of a farmer. In particular, productivity of plantations given to ARBs under a certificate of land transfer (CLOA) suffered tremendously due to cutting up of plantations into small sizes, thus undermining economies of scale. Any gain that the farmers could have obtained from owning the entire harvest from his land is lost to decreased productivity.

Improving efficiency in agriculture production creates domino effects from producers/farmers' income to national concerns such as regional and national outputs and self-sufficiency food and even non-food requirements. Production efficiency becomes self-sustaining when it enables farmers to earn and re-invest in production. Thus, agricultural production should be an enterprise in itself. Based on this premise, the project is of multi-component to address the causes of declining production and productivity as well as poverty alleviation. The project will have a project management office (PMO) under the DAR Undersecretary for Support Services. It will manage the project funds and ensure the effectiveness of implementing all components of the project. This project will have the following features and components.

Determination of ARCs for inclusion in the project

As there are completed and ongoing projects for provision of support services to ARBs, this project will consider ARCs without support services received. It is to be implemented in various ARCs where more than 50% of the farmers are ARBs or more than 50% of the agricultural lands are under CLOAs.

Needs assessment of chosen ARCs and project design

Since the ARCs are under varying circumstances, they will have different needs. Needs assessment is necessary to design the project responding to the needs. Based on these identified needs, intervention will be determined and designed for each ARC. Infrastructure, technical assistance on production and marketing, credit, etc. will be provided in accordance with the design.

Implementation

Implementation of the project will start from social preparation of the ARBs to mentoring and guidance. The ARBs will need to embrace the culture of associations, cooperatives and business organization. New farming systems may be introduced as needed. More importantly, the ARBs and their organizations will have to be taught and reared into successful agri-businesses that could compete with corporations in the same business.

Monitoring and evaluation

The PMO will have a system of monitoring and evaluating ARCs that will provide status information on a regular basis to correct procedures and processes along the way.

Impact assessment

At the end of the project, each ARC will be assessed for the impact of the intervention including improvement. After the project, all the ARCs should be left to operate by themselves.

10.2.2 Agricultural cooperatives empowerment project*

The reputation of cooperative development in the Philippines as a whole has not been very encouraging. The number of cooperatives that turn inactive after having successfully registered is staggering. In fact, a lot of reviews of cooperatives have already been done to yield some basic understanding of causes of instability of cooperatives. Among them are the wrong motives and the lack of institutional leadership.

Many cooperatives have been used as conduits of government and non-government social programs, and cooperatives could actually serve well as such. However, many cooperatives have been established for this purpose without consideration of longevity, i.e., sustaining operations even after the program. Thus, cooperatives that started as conduits readily become inactive after the completion of a particular program. This runs counter to the objectives of cooperative development where cooperatives are meant to be media for people with little or no capital to undertake business collectively.

Despite the seeming failure, cooperatives have certain strengths that can improve agriculture under the hands of small holders as shown in some success stories of cooperatives development in Bangsamoro. Yet, facts and figures say that more is needed to make cooperatives effective in achieving their purposes in the farming sector. First, the farmers will have to embrace the spirit of group undertaking such as livelihood, collective ownership of resources and operation of businesses from their individual economic activities. Then, support tailor-made for the need of each cooperative should be provided at all stages. Nurturing of a cooperative after it has been established is an important support mechanism. This requirement would entail the following.

1) Strengthening the Cooperative Development Authority (CDA) to carry out its difficult dual function of regulation and development. The agency would need a bigger budget to increase its staff, particularly those that assist the cooperatives and support cooperatives development program. The possibility of having cooperative support workers immersed in the communities should be studied. This will enhance monitoring for purposes of assisting cooperatives through knowing the needs and providing problem-solving assistance.

2) Enhancing the training capability of CDA to go beyond organizational trainings. CDA should be able to provide a continuous training program to sustain the need of cooperatives for capable leaders and managers and skilled staff to handle administrative as well as technical jobs as required. Training modules should necessarily include: value formation designed for people desiring to become cooperative members, developing potential leaders, technical and administrative staff of cooperatives, etc. This will necessitate establishment of a training center for cooperative development.
3) Establishing cooperative centers in strategic places that could provide accessible assistance to cooperatives. Each center should be able to provide cooperatives assistance in accessing financing and support from various programs of government and other institutions. This assistance should include preparation of feasibility studies and business plans, preparation of project proposals, entering into contracts or agreements, implementation of projects, finding network and linkage, etc.

These will be undertaken under the project. About two or three cooperative centers as described above will be established first under the project for demonstration purposes.

10.2.3 Small water purification plants distribution project

Some areas in Bangsamoro especially in rural areas, the village or barangay population has been facing difficulty to ensure clean and safe potable water for daily life because of the progressing degradation of water quality or scarcity of safe potable groundwater or surface water of a river or pond nearby. The financial burden to constantly procure bottled clean water has been increasing as well.

There exists a self-standing water purification plant that can produce safe potable water at the minimal cost by the use of rapid flocculants made of volcanic ash. This type of treatment plant can process 500 liters of dirty, contaminated, or otherwise unpotable water in 10 minutes per batch with the least cost. It is possible to operate this plant even in rural areas where no electric power is available. A small diesel power generator of 4 kW is sufficient to run the plant for 10 minutes per batch. The operating and economic performance of this rapid water purification plant has been examined in Vietnam under the JICA program for the promotion of Japanese SMEs in the overseas market.

The construction cost of a rapid flocculant water treatment plant is about US$9,000 per unit. Assuming the sales price of purified water at PHP 12.5 per 20 liters or one-tenth of prevailing market prices of purified and bottled water in one-gallon plastic container, the financial internal rate of return (FIRR) would be in the range of 18.0–27.5% depending on the demand of purified potable water per day. The payback period of initial capital investment is 3–4 years. A village or barangay in need of a water treatment facility can purchase the plant, recover the cost, and solve its drinking water problem in a relatively short time. The village/barangay may form an organization by volunteer or concerned residents to operate the plant. Further, reportedly a suitable quarry site of volcanic ash rocks or sand necessary for the rapid flocculant can be found in Bangsamoro or the surrounding areas of Mt. Apo. Therefore, if LGUs would provide long-term loans for such organizations, rapid flocculant water treatment plants could be widely introduced in Bangsamoro.

10.2.4 Power supply system maintenance improvement project

Boom trucks provision

Most electric cooperatives (ECs) in the ARMM area are running in the red. Accordingly, the ECs cannot afford to properly maintain boom tucks required for maintenance and construction works of power distribution facilities and have no choice but to continuously use them due to the lack of financial resources. Furthermore, the boom trucks owned by ECs are so aging that they frequently break down and it is difficult to find the spare parts that are no longer manufactured. In order to improve this situation, it is effective to provide boom trucks with bucket (BTB) and boom trucks with digger (BTD). BTB and BTD manufactured in Japan are medium-scale vehicles so that they consume less fuel compared to the existing large vehicles manufactured in the U.S. Furthermore, they have high mobility. Hence, they are suitable to operate under the narrow road condition in the Philippines and can contribute to the improvement of capability of maintenance and construction work of power distribution facilities.

Transmission substation and distribution materials procurement

Many distribution facilities of the MAGELCO's franchise area belonging to the ARMM area were installed in the 1970s through the 1980s, and approximately 60% of the poles are inclined and seriously deteriorated. Therefore, urgent replacement should be conducted. Also, illegal connections of service wires and breaking of kWh meters in the area are commonly observed in the franchise area, and MAGELCO is facing difficulties in the tariff collection as well. Furthermore, MAGELCO has managerial problems due to a high rate of distribution losses. MAGELCO was ranked in the last place according to the performance assessment by NEA. MAGELCO has been formulated construction and rehabilitation plans of distribution facilities to satisfy the increasing power demand in the franchise area including the following.

1) Construction of 102 km of 69 kV lines with 13.2 kV under-built lines,
2) Construction of 115 km of 132 kV lines,
3) Installation of 10 MVA substation at PARANG substation,
4) Upgrading of SALBU substation to 10 MVA capacity,
5) Installation of 5 MVA substation at KAURAN substation with power transformer from SALBU substation,
6) Installation of 5 MVA NURO substation,
7) Installation of switchyard at HQ substation,
8) Installation of switchyard at KAURAN substation,
9) Installation of 30,000 units of kWh meters and accessories, and
10) Procurement of construction and transportation vehicles.

The following scope of the project has been selected as part of the components listed above; no construction vehicles are included because construction vehicles are being considered to be supplied prior to the implementation of this project.

a) Power transformer and substation equipment for new construction and improvement of substations, consisting of one lot of substation equipment for a HQ substation and one unit of 5 MVA equipment for a NURO substation.
b) 69 kV/13.2 kV transmission and distribution facilities with a total length of 30 km, under-built lines, and concrete poles.
c) Digital kWh meters and accessories (10,000 sets)

Island airports security improvement project

At the Jolo airport in Sulu and the Sanga-Sanga airport in Tawi-Tawi, passenger baggage is currently screened manually one by one. X-ray baggage screening equipment shall be installed at these airports along with metal detector to ensure the security in accordance with the relevant regulations.

Efficient waste collection and recycling support project

Barangays are responsible for the collection, segregation, and recycling of biodegradable, recyclable, compostable and reusable wastes. Material recovery facilities (MRFs) should be established in every barangay or cluster of barangays. MRF is a facility to receive, sort, process and store compostable and recyclable materials, usually with an open space with a roof, a temporary office, and a rest place for workers. Marawi City has 96 barangays, and a plan to have 60–65 MRFs in total, consisting of 45 MRFs for 45 urban barangays and 15–20 MRFs for 51 barangays. The Plan has not been realized because of lack of fund, though some model MRFs have started.

Other than this, inefficient waste collection is another problem. The City has only six ordinary trucks, which are not efficient to carry wastes as wastes are sometimes bulky. Therefore, introduction of compactor cars is considered to help to make collection efficient. The required cost is summarized below.

- MRFs: PHP 75,000 x 50 = PHP 3,750,000
- Compactor cars (6 m^3): PHP 5,000,000 x 3 = PHP 15,000,000

(7) Labor-based road rehabilitation and maintenance project*

A new policy in road development should be to include farm-to-market road (FMR) improvement in any projects to improve trunk roads. Given 80 major road projects identifies for improvement, the estimated length of FMRs to be improved is about 884 km. Taking into account the importance of peace-building and job creation which would demand immediate attention after combatants return to civilian life, labor-based road construction and maintenance method should be applied to FMRs works.

JICA has recently completed two-pilot projects in the municipalities of Sultan Mastura (Maguindanao) and Matungao (Lanao del Norte) using this technology. The two projects were successful and useful reference for future projects involving labor-based technology. From this experience, a manual titled *Basic Manual for Road Rehabilitation and Maintenance by Labor-Based Technology* was produced and defined the technology as "the construction technology utilizing the participation of the community as labor force supplemented with light equipment such as compactors to ensure the quality of construction works". This manual established correct procedure in terms of (i) road standards; (ii) construction methodology, (iii) work supervision and monitoring, (iv) community organization for their involvement and other important aspect of works. It is envisioned that sizeable number of working force would come from the community and combatants with the overall supervision of a municipal engineer.

10.3 Concerted Pump Prime Initiative

10.3.1 Pioneer-focused area development program

The area development approach is effective in providing a set of support measures in a comprehensive and mutually cohesive way to facilitate local people in a selected area to improve their livelihood. Support measures include provision of basic services such as primary education and preventive health care, basic infrastructure such as access roads, water supply, electricity and sanitation facilities, and some community facilities. This approach is applied to such areas that would not naturally be part of any economic corridor analyzed in the sub-section 9.2.2. They include island provinces in particular. Of the three island provinces, Sulu and Tawi-Tawi are effectively covered by the Jolo and Bongao urban functions upgrading project, and thus the Basilan project is proposed here.

A socio-economic survey was undertaken as part of the JICA Study for the former Abubakar MILF camp as a pilot case to establish approaches and methods of the survey. The survey covered six municipalities of Kapatagan, Balabagan, and Maragong in Lanao der Sur; and Matanog, Buldon, and Barira in Maguindanao. Based on the survey, the Abubakar project has been formulated. To cover the central part of Maguindanao, another project has been formulated.

(1) Abubakar integrated area development project*

Specific components of the project are suggested as follows. For the livelihood and economic activities to be supported by the project, corn farming may be selected as corn is one of the most widely produced crops. To increase corn productivity, technical extension and training and mixed crop cultivation with vegetables may be promoted. Corncobs may be used together with other crop residues for composting or vermicomposting. In view of generally poor conditions of rural roads in the area, a few farm-to-market roads should be included in the package of support with priority to corn-producing barangays. Concrete pavement of the roads linked to the paved highway leading to Malabang may also be included to facilitate marketing of corn and vegetables in major markets.

While these support measures are taken for rather conventional crops cultivation, preparations for diversifying rural socio-economy should be made through new livelihood and economic activities. A prerequisite is improvement in water supply and electricity. The area has several waterfalls that may be tapped for mini hydro power and also water supply. They include Lingae, Mayaman, and Pabrica waterfalls in Marogong, Igabay falls in Balabagan, and waterfalls in Barira and Matanog. When the development of these waterfalls is planned, possibilities to develop eco-tourism should also be examined.

A specific area development project should be formulated in the immediate future, followed by

implementation. Detailed field surveys should be undertaken to validate the possible project components suggested above, which include

1) Technical extension/training for pest control, fertilization, proper combination of crops for mixed farming, etc.;
2) Composting or vermicomposting of crop residues;
3) Improvement of farm-to-market roads;
4) Pavement of selected semi-artery roads; and
5) Multi-purpose waterfalls development for mini hydro power, water supply and eco-tourism.

Of these, the component 1) may be undertaken effectively under the Mixed Field Crops Farming Project, but it should be covered by the detailed planning to ensure consistency with other components. Improvement of farm-to-market roads should be implemented by applying labor-based technology to contribute to the generation of employment opportunities for former MILF combatants. Provision of basic tools and in-field training for the construction is part of this component. For the waterfalls development, detailed planning and selection of priority schemes and design of the priority schemes should be carried out together for early implementation.

(2) Basilan integrated area development project

Specific components of the project are suggested as follows. For the livelihood and economic activities to be supported by the project, rubber farming may be selected as rubber is one of the most widely produced crops. As rubber production cannot be easily combined with other crops for mixed farming, integrated farming is the direction to pursue as supported by the ongoing AICCEP project. Basilan has a few falls in Lantawan Municipality that may be tapped for mini hydro power development and possibly also for water supply. For water supply, springs are also reported as possible water sources for Lantawan and Tipo-Tipo. Small irrigation development is also proposed by the provincial government. A few farm-to-market roads should also be combined in the project.

A specific area development project should be formulated in the immediate future, followed by implementation. Detailed field surveys should be undertaken to validate the possible project components suggested above. Some component projects may be undertaken more effectively under other proposed projects such as the rubber industrial cluster development project and the mini hydro power development project. The areas development approach is justified as locations of possible project components extend from Lantawan in the northwest to Tipo-Tipo in the east of the main island.

(3) Central Mindanao integrated area development project

The project should cover the area between the proposed central and southern economic corridors. Development of this area is important to link the two corridors for balanced development of Maguindanao and also Bangsamoro as a whole. The municipalities of Ampatuan, Shariff Aguak and Datu Sangki Abdullah are included in the area together with parts of neighboring municipalities. An inter-municipal water supply system has been proposed by the provincial government of Maguindanao to cover these three municipalities, tapping springs in Ampatuan. The total discharge of springs is reported to be about 200 L/sec, sufficient to cover the three municipalities.

Ampatuan has a few waterfalls for mini hydropower at Muakat, Taglong, and Tubak. For these waterfalls, detailed planning and selection of a priority scheme and design of the priority scheme should be carried out together for early implementation. For the livelihood/economic activity to be supported by the project, coconut farming may be selected as coconut is one of the most widely produced crops. It may be promoted as part of integrated farming, combined with goat production or the coco products industrial cluster to be supported by the ongoing AICCEP project.

A road connecting the two corridors constitutes one of the missing links identified. This road links Pagalungan and Sharif Aguak. An alternative alignment to link Pagalungan and Sultan Sa Barongis is proposed by the provincial government of Maguindanao with 24 km road length, seven cross drains or short bridges and a 1.2 km long bridge to cross the deep portion of Ligawasan Marsh. Dredging of the Rio Grande de Mindanao and the Pulangi River may also be included in the project. The project should be formulated further through a detailed survey to finalize its components.

10.3.2 Spatial structure strengthening program

(1) Artery roads upgrading project*

The regional artery roads in Bangsamoro are the primary road network inside the Region (intra-network). The artery roads upgrading project will construct a new road with a total length of 79.4 km, road surfacing upgrading with a length of 93.3 km and reconstruction of 7.5 km to complete the region's artery roads. The locations of regional artery roads that need improvement in the mainland provinces and in the island provinces are presented in Figure 10.1 and Figure 10.2, respectively. The total cost to improve the identified nine regional artery roads is about PHP 8.14 billion.

The implication of these poor roads to the socio-economic development of the Region is huge. First, the movement of the communities in the influence area of these roads is restricted; second, produce of farmers and fishermen have to endure high transportation costs; third, access to services such as hospitals, markets, government centers, etc. becomes difficult; and fourth, presence of law enforcement becomes minimal which contributes to slow attainment of a peaceful society.

(2) Missing links development project

Missing links are critical part of the network necessary to address to achieve rational distribution of traffic and to strengthen the total network. In the Bangsamoro region, a number of missing links are observed which affect accessibility to large area of the Region and forced people to take a long detour. It is noted there are about 11 missing links in the mainland provinces, but others are included into (i) Bangsamoro artery roads upgrading project and (ii) Corridor link roads improvement project. Overall, there are many areas with accessibility problems in Bangsamoro.

The total cost to eliminate the missing links in both the mainland provinces and the island provinces is estimated at PHP 6.84 billion. Location maps of the identified missing link projects are indicated in Figure 10.3 and Figure 10.4.

(3) Ring roads/bypass roads development project

In the Bangsamoro region, there are a couple of highly urbanized areas which experience serious traffic congestion and urban sprawl. This is not unique in the Region as the same phenomenon is observed in other cities of the Country. From the transportation point of view, provision of bypass roads would improve traffic flow since the build-up area where traffic congestion is serious is circumvented by passing vehicles. Likewise, removal of through-traffic from the center of the town decongests the city road, improves travel speed, and reduced road accidents.

A ring road on the other could both serve as bypass road and important facility to guide sound urbanization by providing a high capacity trunk road at the outer edge of the city or the existing urban core. This facility ensures good accessibility to commercial areas and residents moving in/out of the urban core.

The total cost of identified ring roads and bypass roads both in mainland provinces and island provinces is about PHP 3.80 billion. Location maps of the identified missing link projects are indicated in Figures 10.5 through 10.8. Estimated length and objectives of each road is provided in Table 10.2.

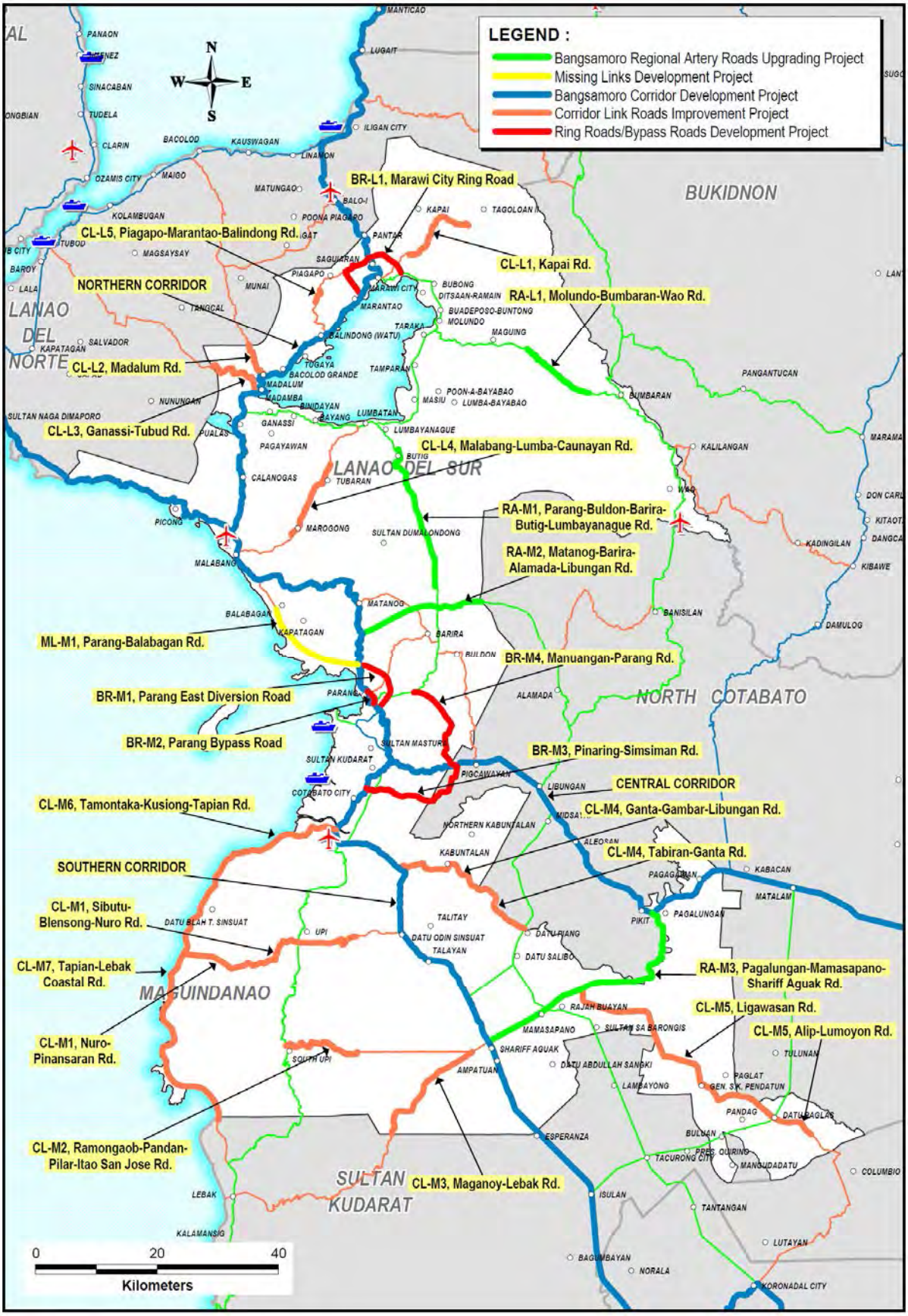


Figure 10.1 Locations of Bangsamoro Artery Roads for Improvement: Mainland Provinces

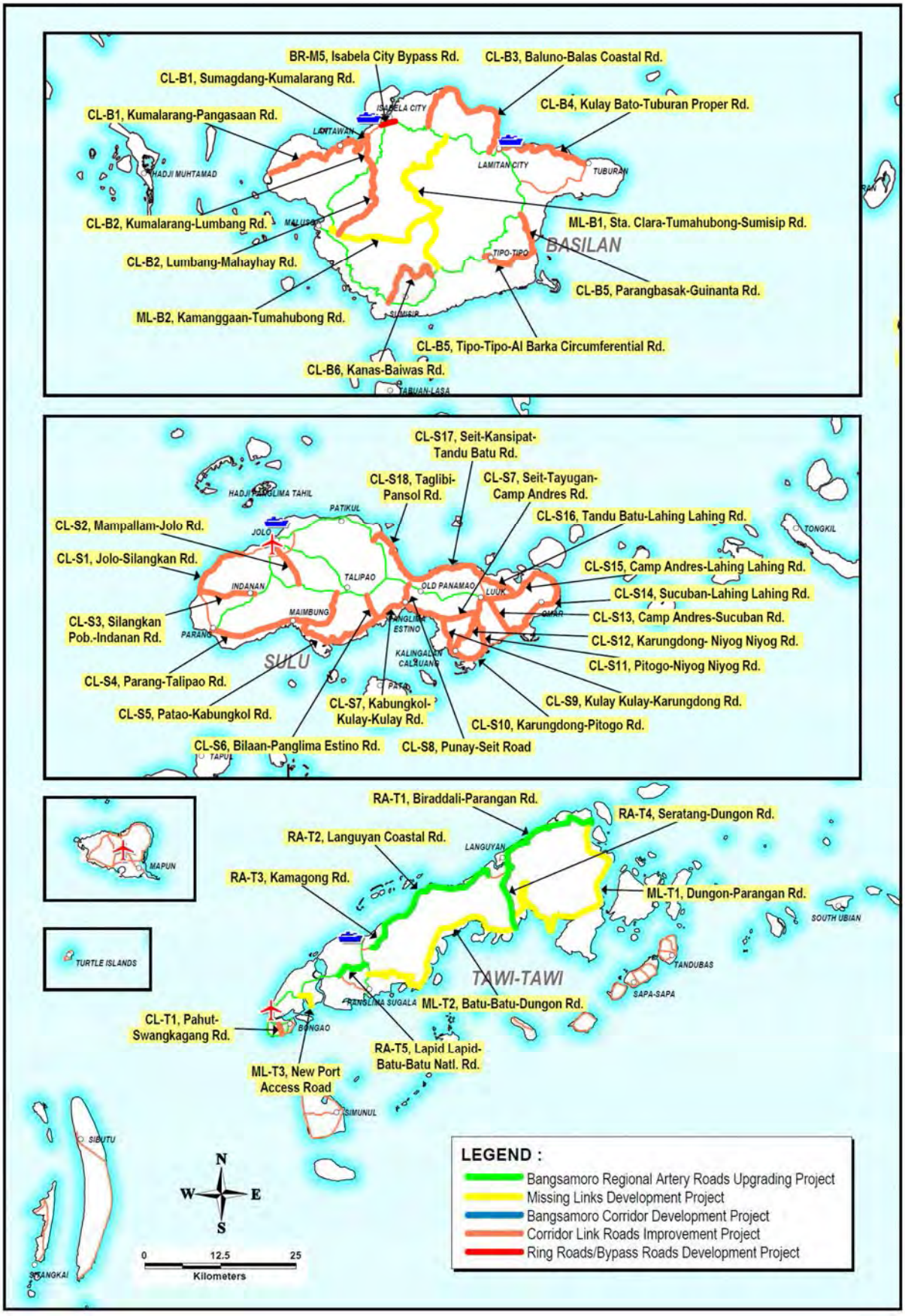


Figure 10.2 Locations of Bangsamoro Artery Roads for Improvement: Island Provinces

Figure 10.3 Locations of Missing Links: Mainland Provinces

Note: DPWH-ARMM allotted PHP 252.0 million to construct 21.0 km portion of 38.5 km ML-B1

Figure 10.4 Locations of Missing Links: Island Provinces

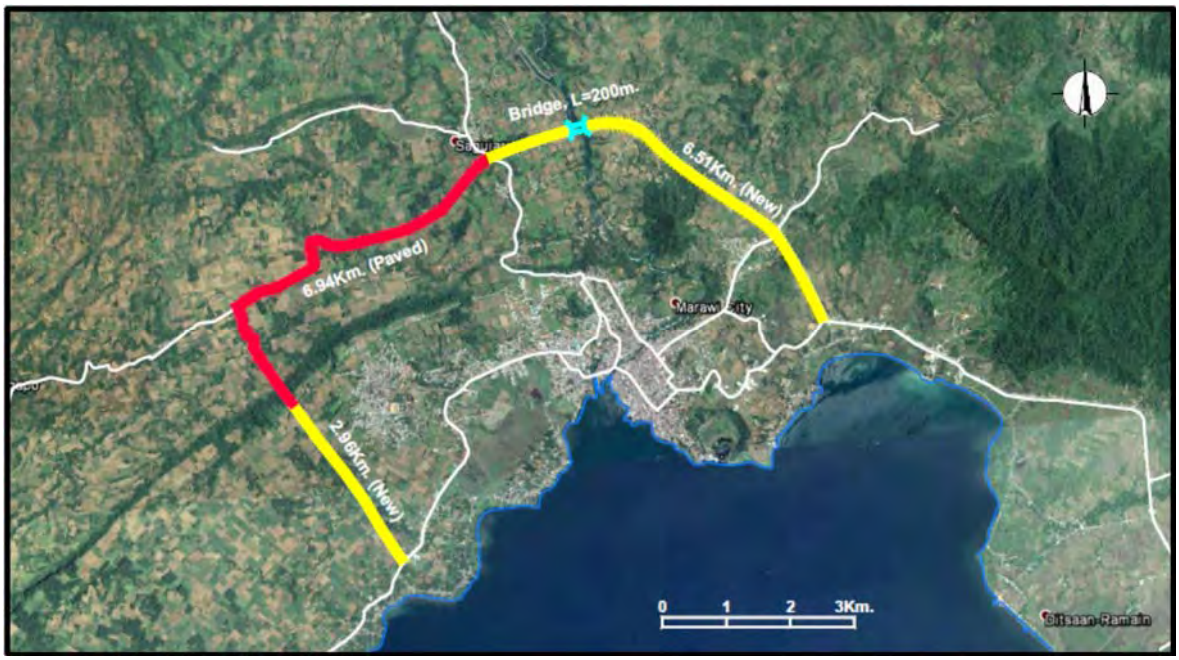


Figure 10.5 BR-L1 Marawi City Ring Road (L=16.7 km)

Figure 10.6 BR-M1 Parang Bypass Road (L=2.5 km)

Figure 10.7 BR-M2 Parang East Diversion Road (L=11.2 km)

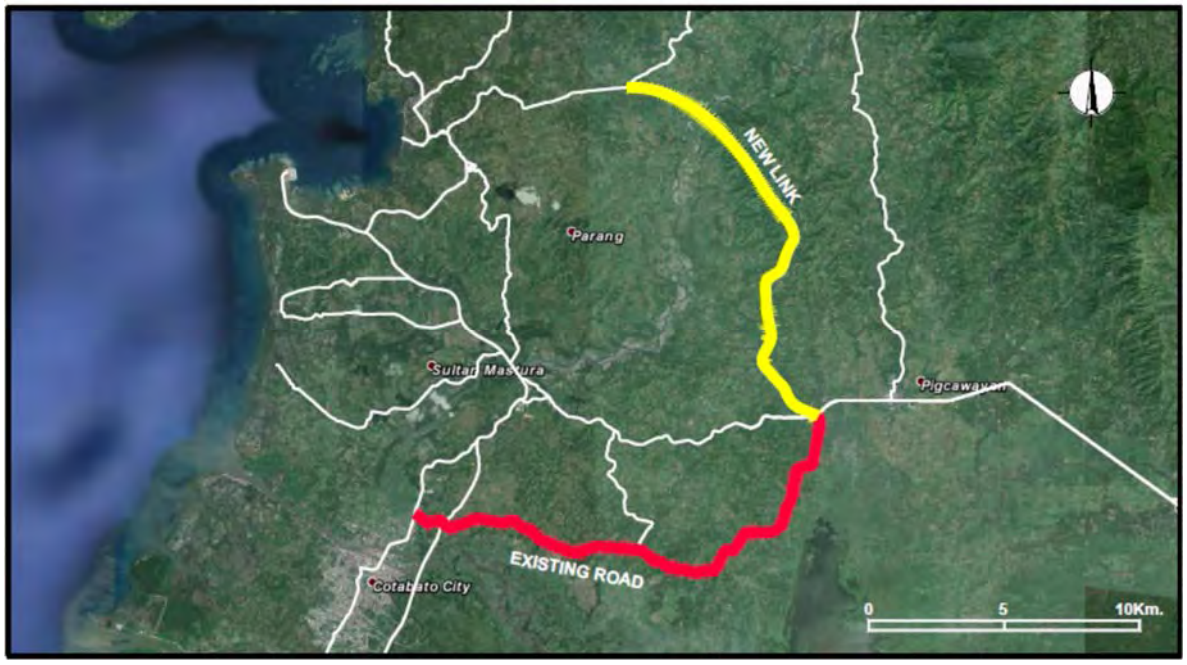


Figure 10.8 BR-M3 and BR-M4 Greater Cotabato Ring Road (L=38 km)

Table 10.2 Name of Ring Roads/Bypass Roads and Objectives

Road Name	Length (km)	Objectives
BR-L1 Marawi City Ring Road	16.7	- To bypass the congested area (built-up area) thus improving traffic flow, reducing traffic congestion, improving urban environment and traffic safety. - To improve traffic circulation by expanding the capacity of the network and by removing bottleneck sections of the network - To support sound urbanization of Marawi City by providing high capacity trunk road at the outer edge of the city.
BR-M1 Parang East Diversion Road	11.3	- To strengthen the National Highway No. 1 (NH1) and to support socio-economic integration of Bangsamoro region - To improve traffic circulation by addressing traffic bottleneck section of NH1
BR-M2 Parang Bypass Road (small)	2.5	
BR-M3 and BR-M4 Greater Cotabato Ring Road	37.1	- To form flexible network by linking three (3) Primary Inter-city Roads - To improve access to agro-fishery production areas
BR-L1 Isabel City Bypass Road	2.4	- To provide alternative route to insure that the collapse of the Aguada Bridge will not isolate the community in the western side of the city - To support socioeconomic development of Isabela City by improving traffic circulation

(4) Polloc port upgrading project*

The Polloc port was constructed in 1977 by the Nam Kwang Construction Company, Ltd. funded by ADB. The port operation was started by the Philippine Ports Authority (PPA) in March 1980 and transferred to DOTC-ARMM. Operation and management of the Polloc freeport was started in 2010 by the Regional Economic Zone Authority (REZA).

Existing facilities

Existing facilities of the Polloc port are summarized below.

- Total area of Polloc freeport: 129 ha
- General purpose marginal wharf: 400 m long 10.5 m deep
- Lighter dock: 67 m long 3.0 m deep

- Transit shed: 11,960 m^2
- Open storage area: 42,940 m^2
- Parking area: 23,364 m^2
- Passenger terminal building: 600-passenger capacity
- Polloc freeport amenity building: 760 m^2 floor area

Future development

The required berth length for the target year 2019, 2022, and 2030 is as shown in Table 10.3. The existing transit shed area and open storage area are sufficient for the projected demand. Container yard and wharf necessary to meet the projected demand are summarized in Table 10.4.

Table 10.3 Required Berth Length of General Cargo and Container Cargo

	Cargo throughput (ton)	Required berth length (a)	Existing berth length (b)	Required extension of berth (a)-(b)	Proposed extension of berth (m)
2019	921,197	460	400	60	0
2022	1,060,318	530	400	130	200
2030	1,542,860	772	400	372	200

Table 10.4 Summary of Required Facility in 2022 and 2030

Required	2022	2030
Completion of wharf construction	200 m	
Completion of wharf construction		200 m
Completion of container yard		25,000 m^2

The medium- and long-term development plans for 2022 and 2030 are indicated in Figure 10.9 for 2022 and Figure 10.10 for 2030 based on the required facilities determined above. In the subsequent stage, cargo and passenger traffic for the Polloc port should be projected in detail based on the Bangsamoro development plan, including the potential demand to be diverted from other ports in Mindanao, demand to be generated newly by Bangsamoro development, and shipping lines to be attracted by upgraded port facilities.

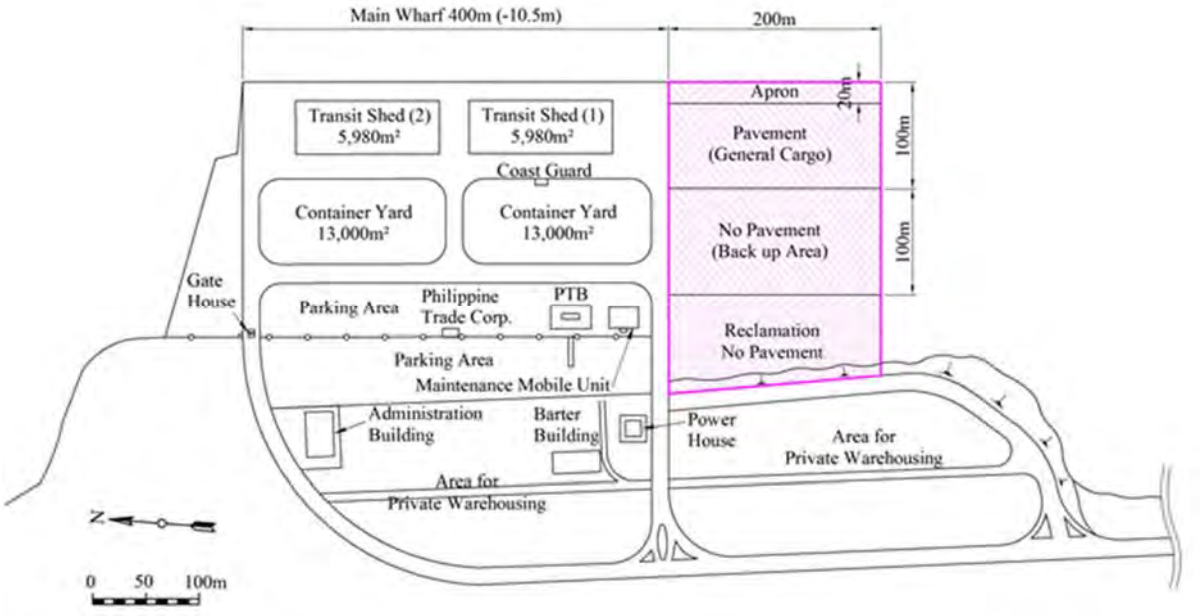


Figure 10.9 Polloc Port Development Plan by 2022

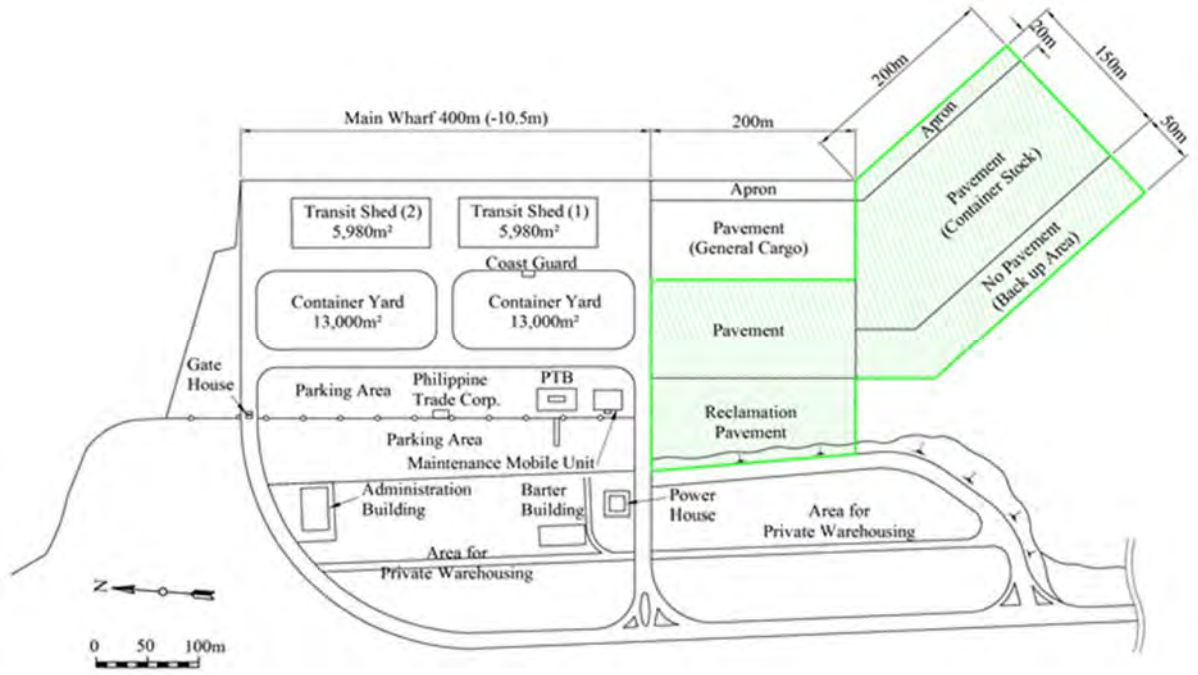


Figure 10.10 Polloc Port Development Plan by 2030

(5) Cotabato airport improvement project*

As part of the improvement of the existing Cotabato (Awang) airport, the following development will be carried out by DOTC according to the CY2016 Awang Airport Consolidated Improvement Plan, especially focusing on the short-term future development plan. The proposed plan includes the following:

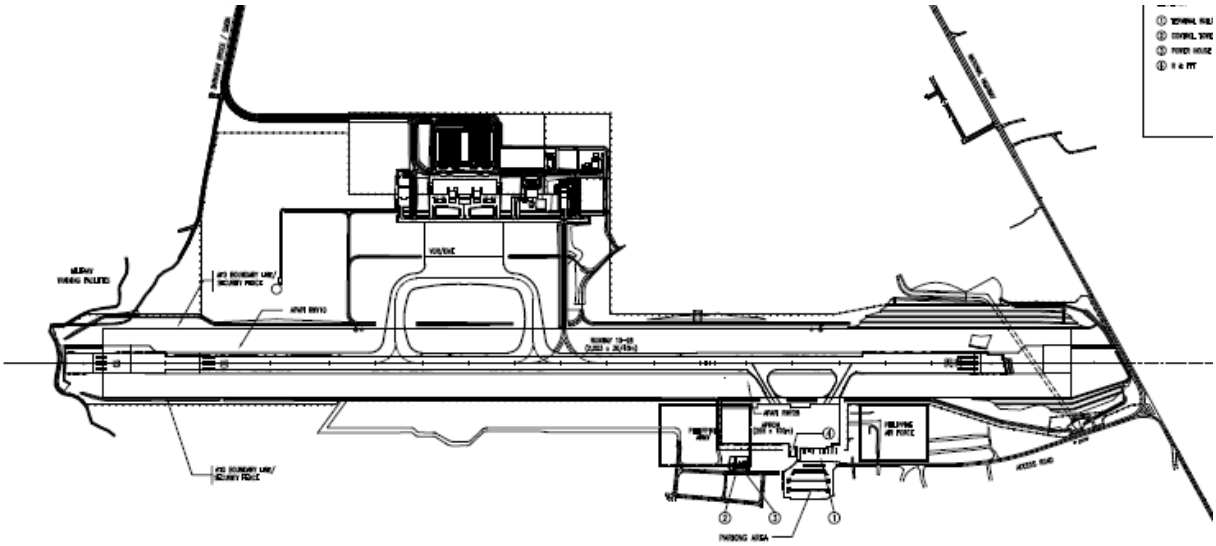
1) Improvement of existing terminal building,
2) Improvement of security fence,
3) Provision of cargo building and airlines offices,
4) Provision of airport security office and quarters,
5) Provision of guest/staff house for the Civil Aviation Authority of the Philippines (CAAP),
6) Provision of deep well with elevated water tank,
7) Provision of access road center island,
8) Provision of standby generator set with power house,
9) Repair and improvement of drainage system, and
10) Landscaping, ground improvement and beautification.

It can be expected that the conditions of the existing passenger terminal building will be improved as the cargo building and airlines offices are newly established and the activities are undertaken in the new building instead of the existing passenger building.

Apart for the development described above, a further development plan for the Cotabato airport has been proposed with a new terminal area on the opposite side of the existing one, based on the previous JICA study and the feasibility study by ADB of 2006. The newly proposed layout of the Cotabato airport is illustrated in Figure 10.11.

(6) New Bangsamoro airport establishment project

A new Bangsamoro international airport is expected to be established as the gateway to the Region as several constraints exist for further development of the existing airport. A rice field which is located in the flat land without any hills and mountains in the municipality of Sultan Mastura near the Polloc port is likely to be a potential candidate site for the new airport.



Source: ADB.

Figure 10.11 New Terminal Area Development Plan in Cotabato Airport

The outstanding issues to be examined for the establishment of an international airport in Bangsamoro are discussed. The existing Cotabato airport still remains to have sufficient capacity on runway to accommodate A320 aircraft as the maximum capacity aircraft. The airport also has essential capacity on terminal facilities to accommodate a single A320 aircraft at one time. On the other hand, it is considered that it is not easy to increase the frequency of the flights between Manila and Cotabato City due to the congested slot coordination at the NAIA even if the traffic demand increases in the near future. In consideration of these situations, how to ensure the viability of the new airport development should be carefully examined in advance of discussing selection of candidate sites.

10.3.3 Comprehensive urban development program

(1) Greater Cotabato City urban infrastructure development project*

Cotabato City is assessed as one of Tier I cities in Mindanao as examined by the urban hierarchical analysis in the sub-section 10.2.1. As compared to other Tier I cities, Cotabato City has the smallest population, although the population growth was highest of all the Tier I cities in Mindanao. It is classified as the 3rd income city, and only city at Tier I not classified as highly urbanized cities.

Cotabato City is expected to serve as the regional capital of Bangsamoro due to its location, largest population of all the urban center in Bangsamoro, and the presence of major port and airport facilities nearby. Its urban functions should be much strengthened to serve the expected functions. As the high population growth is expected to continue, the capacity of urban infrastructure needs to be continually expanded. Moreover, Cotabato should be equipped with some higher order urban functions such as commercial and financial center of Bangsamoro, export base, advanced research and education and some specialized health care.

To satisfy these conditions, Cotabato City should develop more appropriate physical structure and its urbanized area should be much expanded to accommodate a variety of functions and facilities. For this purpose, the urban area of Cotabato City should be effectively expanded including surrounding areas. This does not necessarily mean that the jurisdiction of the City should be expanded, but proper administrative structure may be introduced for better urban management of this Cotabato metropolitan area in cooperation with the neighboring municipalities.

As the first step to upgrade urban functions and facilities of Cotabato City, an urban development master plan should be prepared for the Cotabato metropolitan area to be defined. The plan should clarify the physical structure of the area including artery and sub-artery road network and macro zoning of land

use, and socio-economic framework including population projection and expected functions to be strengthened. Within the structure and the framework, infrastructure and utilities such as city roads, water supply, sewerage, electricity, solid waste management and logistic infrastructure should be planned. The Polloc port upgrading with a free port and economic development and a new Bangsamoro international airport should be examined and their stage wise development plans should be formulated.

(2) Jolo and Bongao urban functions upgrading project*

While the mainland portion of Bangsamoro is reasonably well covered by urban centers at higher tier as analyzed by the urban hierarchical analysis reported in Section 9.2.1, the island provinces are poorly represented by higher order urban centers. In Basilan, Isabela City is ranked at Tier II, but Sulu and Tawi-Tawi have only Tier III urban centers. Urban functions of Jolo in Sulu Province and Bongao in Tawi-Tawi Province should be improved to upgrade these urban centers to Tier II, respectively.

To upgrade Jolo and Bongao, development of livelihood and economic activities in the respective provinces as a whole is necessary. This should be supported by integration of the respective territories by improvement of road network on the main islands and port facilities and links with island municipalities. Water supply and electricity should also be improved with expanded areal coverage. Specific projects to realize these are proposed under different projects, but institutional support should also be introduced by the project. The possibility to provide a package of support measures in the form of special economic zone should be examined in the subsequent stage.

(3) Urban hierarchy establishment project

Acceleration of urbanization is inevitable in Bangsamoro as economy develops under improved peace and order conditions throughout the Region. Provision of much improved urban services is indispensable to support the Bangsamoro development. To realize this with limited development resources particularly in the public sector, establishment of clear urban hierarchy is necessary. A desirable urban hierarchical system will be examined in the subsequent stage, but Isabela City, Marawi City, and Lamitan City are among the urban centers to be strengthened.

In Marawi City, for instance, there is little or no concerted effort to revive or create new urban areas that will serve as a growth center. Since the inauguration of the city in 1940, little have changed in the overall layout, zoning, or center of commercial activities. There is no proper zoning or improvement in the road system; drainage, water, and sanitation remain unchanged. In conjunction with the Marawi City ring road project, a growth hub may be established connecting the bypass road with the rest of city.

10.3.4 Irrigated paddy development program

(1) Bangsamoro national irrigation systems (NISs) improvement project

The largest support of the Government to paddy production comes through irrigation development since the availability of irrigation services enables two cropping of paddy in one year. In some areas, even three cropping is possible. Thus, cropping intensity in irrigated areas is expectedly 200%. In Bangsamoro, paddy crop intensity in irrigated areas is currently 127%. It is already worrisome that only 49% of the total service area under the eight NISs in Bangsamoro is operational. This is after the NIA has firmed up the irrigation service area of the eight NISs. The figures also indicate that of the operational area, smaller than a half gets the privilege of two or more cropping.

There is a dire need to put in place a project to rehabilitate the eight irrigation systems. The project will include restoration of areas that could not be served due to unserviceable facilities, and development of extension or new areas that could be supplied with irrigation water from the same diversion dam. Diversion dams may also be rehabilitated to restore the physical integrity of the structure. Concrete lining of main canals, laterals and major farm ditches will be undertaken to minimize losses along the distribution system.

The project may be taken up by NIA. About four of the eight NIS are already in the pipeline of NIA

and may be continued even after the take-over of the new Bangsamoro Regional Government to be established under the BBL. Otherwise, the new government will have to implement the project by contracting the services of NIA. NIA has an existing procedure for rehabilitating the NISs in cooperation with farmers' and irrigators' associations.

(2) Communal irrigation systems (CISs) support project*

Communal irrigation system (CIS) is defined by the National Irrigation Administration as an irrigation system with smaller than 1,000 ha service area in contrast with the national irrigation systems (NIS) with more than 1,000 ha service area. Unlike the NISs, the operation and maintenance of CISs are under the irrigators' associations (IAs). Due to the inability of the IAs to finance repairs of canals and structures, CISs have deteriorated resulting to decrease in irrigated area. At present, areas served by CISs in Bangsamoro are only 34% out of the 12,215 ha total service area firmed up by NIA in 2013. Major repairs are needed to restore these portions of the service areas and be irrigated again.

Besides existing CISs, some 110,900 ha was identified and estimated by NIA as potential for irrigation development in 2013. During this year, rain-fed paddy harvested area was 168,000 ha[1], which had an average productivity of about 1.0ton/ha smaller than irrigated areas. If these areas are irrigated, it would add tremendously to production by way of increased productivity and doubling the cropping intensity, thus contributing to higher rice sufficiency and farmers' income. According to the NIA-Corporate Planning Office, most of the areas for irrigation development in the Bangsamoro region could fit as communal or small-scale irrigation projects since there no contiguous areas of more than 1,000 ha identified anymore.

The project would include rehabilitation of existing CISs to restore previously irrigated areas and development of extension areas and construction of new CISs. The activities of the project will include the following.

1) Reconnaissance/field survey to identify projects

   An important strategy of this activity is to encourage farmers, IAs and LGUs to propose projects. Such proposals would be evaluated for technical and economic feasibility.

2) Prioritization of project proposals

   Since this is a multi-year project to be undertaken from 2016 to 2022, proposed projects will be prioritized based on criteria established under the project.

3) Detailed designing and construction of the project facilities

4) IA organizing and strengthening

   IAs would be organized for their participation in the development and eventual turnover of completed communal irrigation projects (CIPs). The NIA scheme and policy for development of CIS is full turnover for ownership and O&M. The receiving IA pays back NIA for the direct cost of construction (mainly labor and materials) and in order to keep the cost low, the IA members are allowed to participate in construction by providing labor. Thus, IA would have to be organized before the start of construction and made to sign a memorandum of agreement (MOA) that would cover construction and turnover of the complemented CIS. This scheme would still be applicable for development of new CISs. Rehabilitation of existing CISs would require strengthening of IAs through training on management and O&M of respective CISs and signing of new MOA covering the cost of rehabilitation.

10.3.5 Economic corridor development program

(1) Bangsamoro economic corridor development project*

There are at least three roads that have potential to become logistics corridors, and eventually economic

[1] Includes all rain-fed paddy where some areas could have more than one crop during the year or some are not feasible for irrigation, such as upland paddy usually planted in sloping areas.

corridor, to support revitalization of the Polloc port. Once the port is revitalized, the intention is not only to capture back the traffic lost to other ports but also offer a reasonable alternative to both domestic and international port cargoes produced outside the Bangsamoro region. These are: (i) Cotabato City–Marawi City–Iligan City–Cagayan de Oro City which referred as Northern Corridor (ii) Cotabato City–Kidapawan City–Davao City which referred as Central Corridor and (iii) Cotabato City–Koronadal City–Gen. Santos City which referred as Southern Corridor (Figure 10.12). The Cotabato City–Valencia City–Cagayan de Oro City might serve as an alternative route for the Northern Corridor. The outlines of these identified logistics corridors are indicated Table 10.5 and Table 10.6.

Table 10.5 Key Components of Three Logistics Corridors

Corridor	Trunk Road			Port	Airport
	From	via	To		
a. Northern Corridor	Cotabato City	Marawi City	Cagayan de Oro City	Macabalan Port and Mindanao Container Terminal	Laguindingan International Airport
Northern Corridor (Alt)	Cotabato City	Valenci City	Cagayan de Oro City	Macabalan Port and Mindanao Container Terminal	Laguindingan International Airport
b. Central Corridor	Cotabato City	Kidapawan	Davao City	Sasa Port	Davao International Airport
c. Southern Corridor	Cotabato City	Koronadal	Gen. Santos City	Makar Wharf	Gen. Santos International Airport

Note: There are three international airports in Mindanao (airports of Davao and Gen. Santos and Zamboanga); airports of Cotabato City and Cagayan de Oro city are classified as Principal Class 1

Table 10.6 Characteristics of Existing Roads in Proposed Corridors

Corridor Name	Road Name	Road Length (Km)		Number of Lanes (km)				Total (km)
		Bangsamoro	Outside Bangsamoro	Bangsamoro		Outside Bangsamoro		
				2	≥ 4	2	≥ 4	
Northern Corridor	Cotabato–Marawi–Iligan–Cagayan de Oro	157.30	115.38	157.30	-	100.00	15.38	272.68
Central Corridor	Cotabato–Kidapawan–Digos–Davao	31.43	194.74	31.43	-	148.20	46.54	226.17
Southern Corridor	Cotabato–Koronadal–Gen. Santos	73.96	126.06	73.96	-	43.49	82.57	200.02
	Total	262.69	436.18	262.69	-	291.69	144.49	698.87

Economic corridor development for Bangsamoro should be pursued under the following strategies. The first strategy is to strengthen the physical link that connects two major urban centers (e.g. Cotabato City–Marawi City). The second strategy is promotion of the corridor as investment area (e.g. tourism area, agricultural growth corridor, economic zone, etc.), which could be considered as further elevating the corridor into economic corridor. Accumulation of economic activities along the corridor both attracts and generates freight and passenger traffic (Figure 10.12).

The success of logistics corridor will depend on its ability to attract investments. Attracting investment, in turn, largely depends on ability to provide appropriate infrastructure and policies to facilitate movement of people and freight. Thus the following will be pursued.

1) Strengthening of the three identified corridors by upgrading of pavement and widening of lane. This strategy supports strengthening of linkages among major urban areas as well as linkages between indigenous industries and export industries to ports and airports.
2) Improvement of logistics corridors by strengthening links to agricultural areas and primary processing plants.

Of the three proposed corridors, the Northern Corridor has the poorest geometric alignment and pavement condition. A survey carried out by the JST using Dynamic Response Intelligent Monitoring System (DRIMS) from February 2015 to October 2015 reveals that at least 13 km requires immediate repair. The immediate actions to be taken, therefore, are

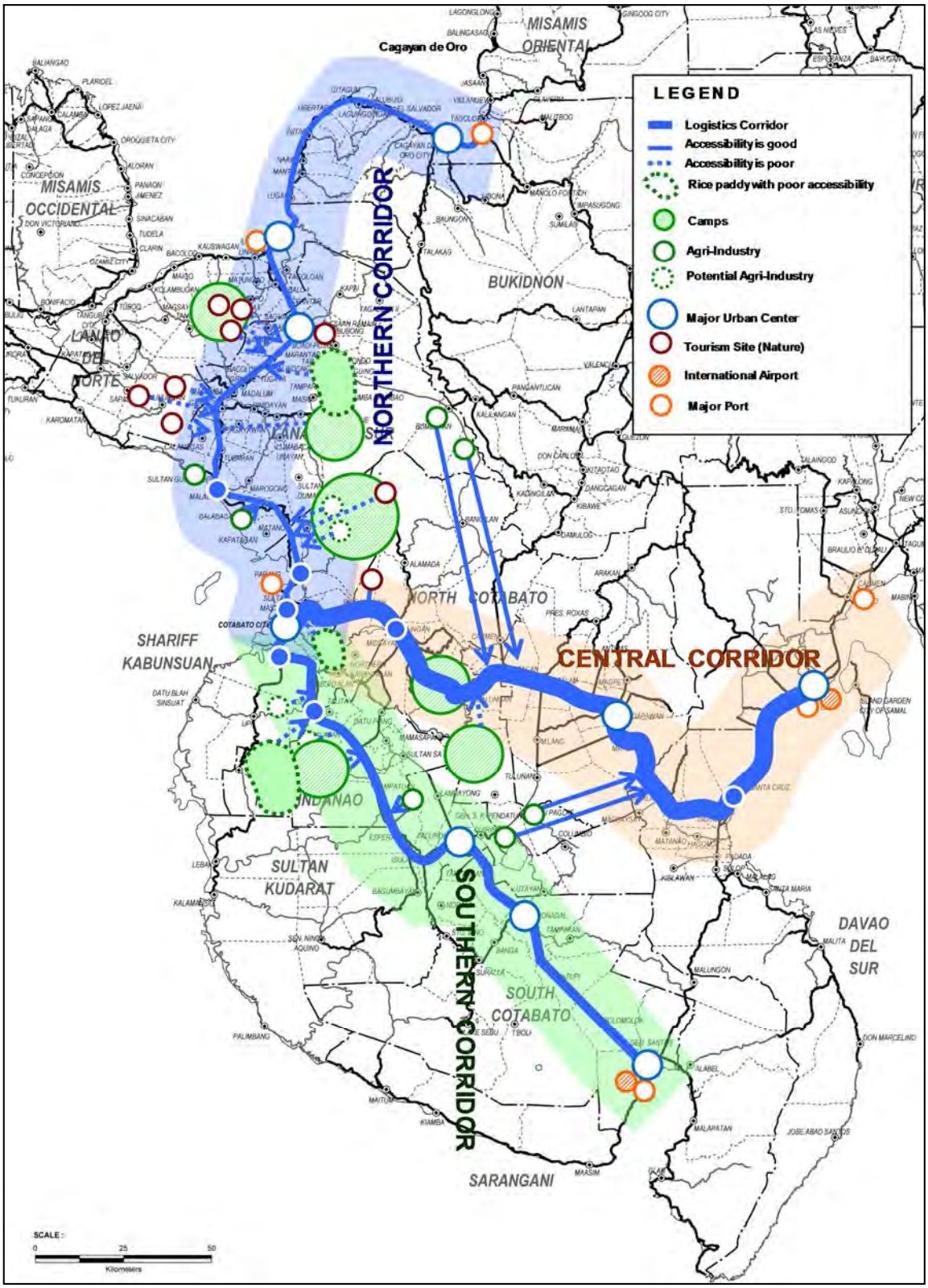


Figure 10.12 Locations of Logistics Corridors and Some of Region's Resources

i) Rehabilitation/reconstruction of 13.7 km road sections with pavement in bad condition, which will cost about PHP 372.8 million; and

ii) Carrying out a feasibility study or preparatory survey on the strengthening of corridors with the objectives of improving road alignment, repairing or replacing bridges in poor condition, and identifying sections to be widened.

(2) Corridor link roads improvement project

The corridor link roads improvement project intends to provide roads with high degree of access to communities and potential development areas. Likewise, these roads are necessary to give shape to the network which would lead to rational distribution of traffic. Most of the works involved upgrading of existing gravel roads into paved roads. Road surface upgrading involves 478.3 km of road length and new road construction involves 93.2 km of road length. Also, 120.5 km of road length needs reconstruction as the pavement has deteriorated to the level of the *bad* category.

The total cost of the identified corridor link-roads improvement projects for both the mainland provinces and the island provinces is about PHP 19.76 billion. The locations of the identified projects are indicated in Figure 10.13 for the mainland provinces and Figure 10.14 for the island provinces.

(3) Polloc free port and ecozone development project*

For Bangsamoro to realize its high development potentials by utilizing strategic position as well as rich indigenous resources, Cotabato City should be developed as the regional capital equipped with major port and airport facilities nearby. In particular, as Bangsamoro is expected to pursue outward oriented development, strong economic corridors should be established encompassing main primary production areas linked to processing centers and export terminals. The existing Polloc port with upgrading should continue to serve as the export terminal for Bangsamoro.

Terminal facilities and functions of the Polloc port should be much strengthened by activating the Polloc free port and ecozone. This includes not only the improvement of existing port facilities as proposed but also the provision of logistic facilities in the immediate hinterland of the port. The area of the Polloc free port and ecozone should be expanded to accommodate sufficient warehouse and container yard spaces as well as an ecozone for export oriented and other industries. A stage-wise development plan should be prepared in the subsequent stage.

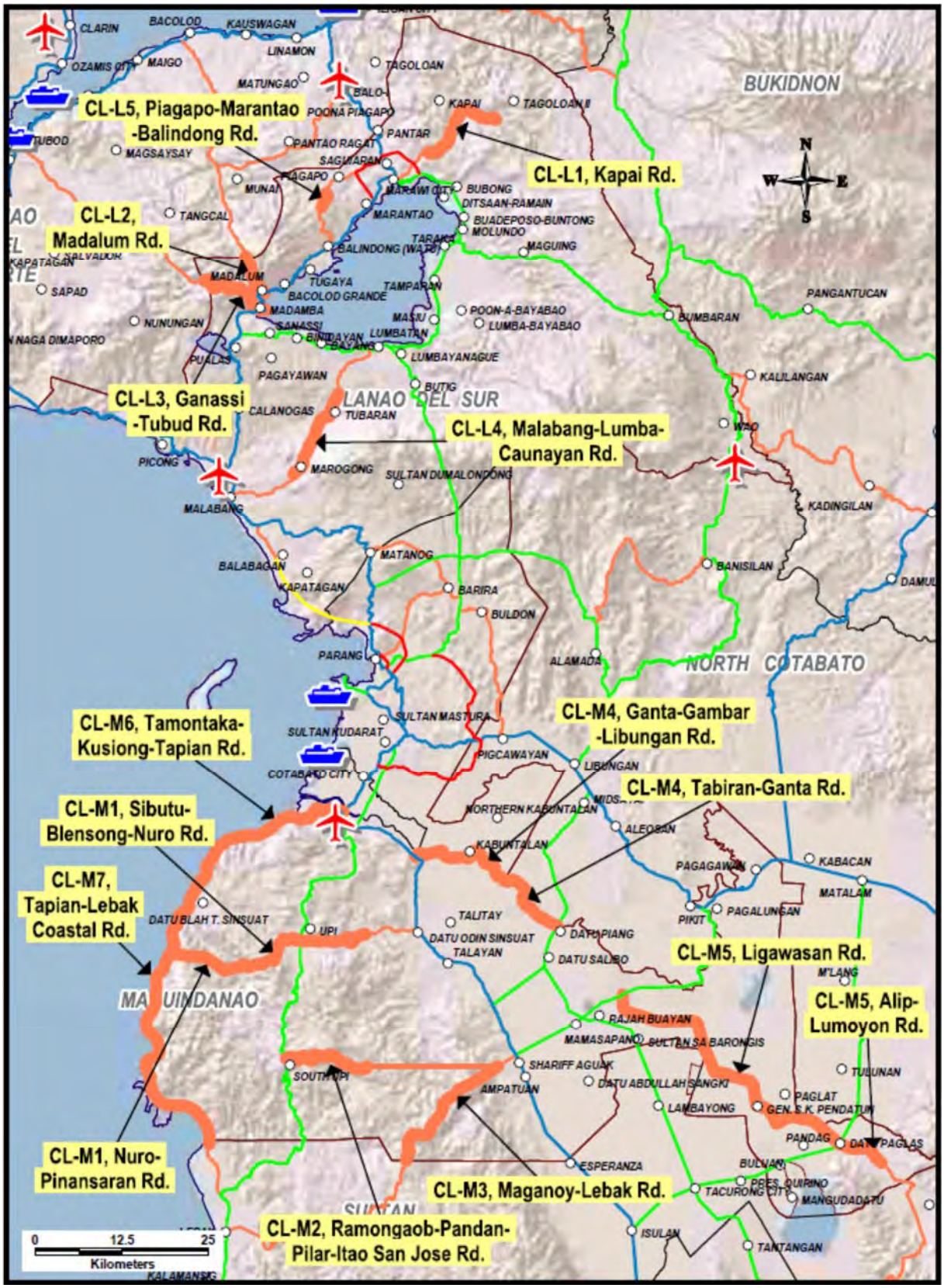
(4) Special employment zone development project*

Employee Rules/Office Regulations of the Philippines are so complicated that many companies feel it is impossible to comply with. Bangsamoro should simplify the labor regulations of the Philippines and also use a more flexible wage setting mechanism. It is important for the Bangsamoro government to assess the relevance of national laws for the Region. Labor protection and wage setting should also consider the culture and the traditions of the people, and businesses should be aware of the possible differences from the rest of the Philippines.

In effect, formal regulations on labor may not have a huge effect in Bangsamoro. For instance, some agricultural companies in the Region have been able to negotiate with their workers for a lower minimum wage rate. In some cases, these lower minimum wages are supplemented with productivity bonuses and/or other benefits according to Bangsamoro's culture. These businesses have argued and explained the importance of their enterprise to the local economy.

Bangsamoro should simplify the labor regulations of the Philippines and also use more flexible wage-setting mechanism. The Bangsamoro government should prepare a humane employee administration district or area where employment insurance, social security and other provisions for desirable employee protection are practiced. This may be called a special employment zone or a version of special economic zone. Under this administration, the private sector can undertake the construction of the industrial employment zone and introduce its own rules on workforce, including the import of foreign technical labor. As a result, these areas can achieve the highest level of labor supply.

By allowing this, the areas with an industrial employment zone could become a hub of high-level industrial human resource supply. In other words, the special employment zone to be established by the private sector serves as a certain training center. In the scenario envisioned by this Project, employees in the SEZ can develop knowledge and skills while working.



Note: DPWH-ARMM allotted PHP 180.75 million to construct 10.04 km portion of 44.5 km CL-M5.

Figure 10.13 Locations of Corridor Links for Improvement: Mainland Provinces

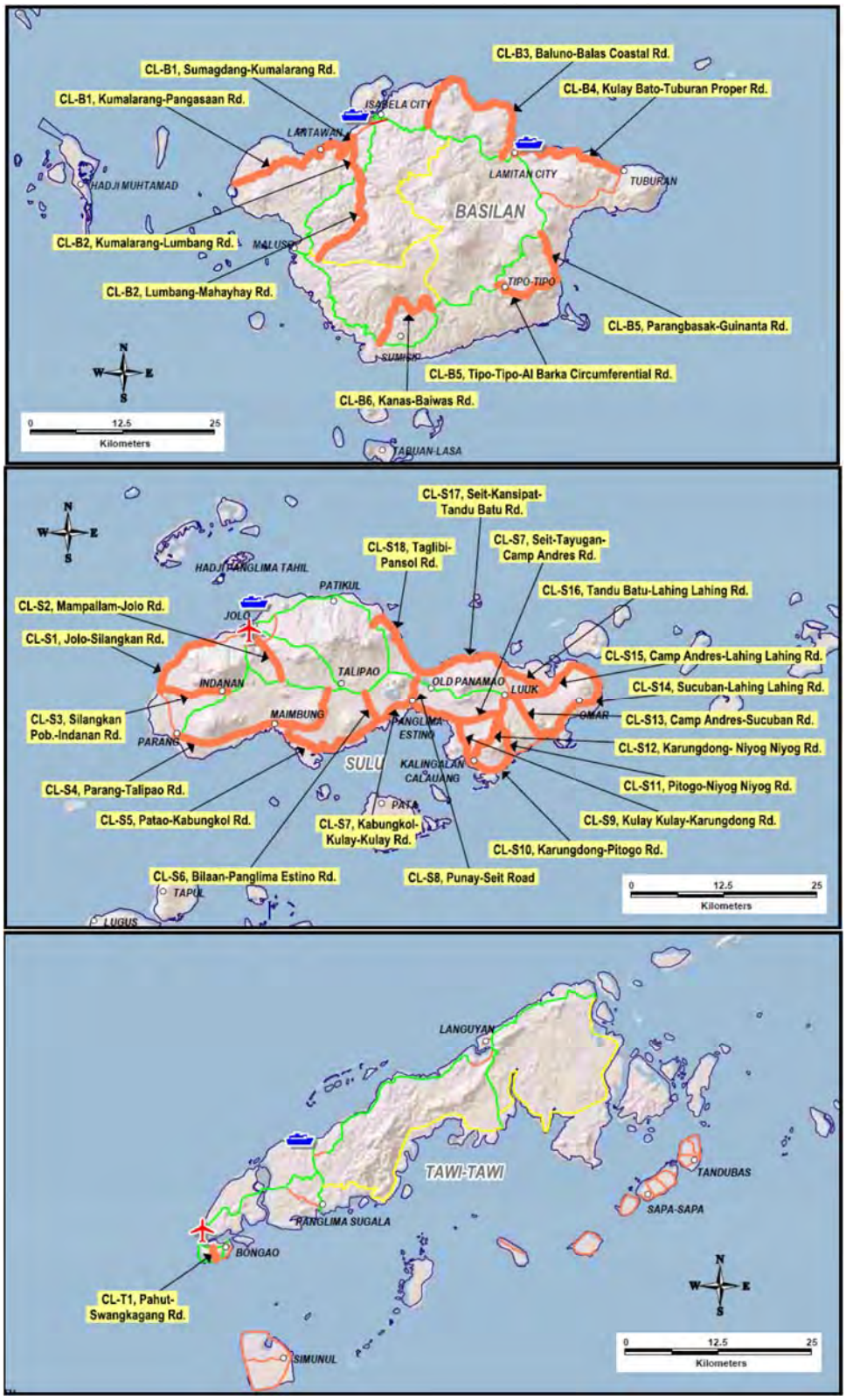


Figure 10.14 Locations of Corridor Links for Improvement: Island Provinces

On the one hand, the establishment of such a special employment zone is approved throughout Bangsamoro. On the other hand, locators in the zone are exempt from regular rules applied elsewhere in the Philippines and allowed to use simplified employment rules and wage-setting procedure. These will make investing in the special employment zones in Bangsamoro more attractive to potential investors than any other incentive or assurance offered in other regular SEZs.

The proposed project concepts may be applied widely to special economic zones, small and large, throughout Bangsamoro, but especially to those in the island provinces of BaSulTa. An ecozone in each island province should be developed with specific characteristics reflecting the resources and advantages of the province as suggested below.

Basilan	Agro-processing based on rubber, cacao, oil palm and abaca Aqua-processing of lobster, crab, seaweed and abalone
Sulu	Agro-processing based on coconut, cassava, abaca and coffee Fish and seaweed processing
Tawi -Tawi	Service-oriented ecozone based on tourism and trade with BIMP-EAGA

10.4 Alternative Socio-economy Promotion Initiative

10.4.1 Agro-based industrial clusters development program

(1) Abaca industrial cluster development project*

Abaca fiber is processed into a variety of forms for industrial purposes such as pulps for paper-based fabrics (banknotes, teabags, napkins, etc.) and blended fibers for handicrafts (handbags, clothes, and ropes). The high demand for abaca fiber, due to its strength and versatility, attracted a large-scale foreign investment into a location near Marawi. The factory monthly requires a supply of over 400tons of high grade abaca fibers, which is equivalent to the current total abaca fiber production in Bangsamoro. The Industry Cluster Component (being implemented until 2016) of the JICA/DTI-ARMM's Comprehensive Capacity Development Project that is currently developing and promoting an abaca industry cluster in Lanao del Sur, provided a fund for the first abaca nursery in Mindanao.

The proposed project, which will succeed the aforementioned JICA/DTI-ARMM's project, will be composed initially of two main components. The first component will be the dissemination of proper fiber extraction technology (hand-stripping, spindle-stripping, and decortication) to farmers located in over 3,000 ha in Lanao del Sur in collaboration with the above-mentioned investor. This will lead to enhancement of the quality of fibers and thus contribution to the increase in growers' income. Also, in Lanao del Sur, practices of adding impurities to abaca fiber (to increase weights) by traders have been widely observed. For this, the supervision and regulation capacity of the Fiber Industry Development Authority (FIDA), a government agency responsible for the monitoring of abaca collection and storage,[2] will be strengthened as the second component of the project.

An abaca industrial cluster should be developed through collaborative efforts of farmers, LGUs, and the private sector. The main participants will be abaca farmers' associations, grading and baling establishment (GBE) in the private sector, MSU for R&D with the gene bank, local handicraft industries, LGUs, and PhilFIDA. A possible scheme for the abaca industrial cluster development is illustrated in Figure 10.15.

For full-scale, step-wise development of the abaca industrial cluster, external support should be sought for technical and financial cooperation. The support may cover the following components:

1) Provision of equipment for improved abaca fiber stripping;
2) Training for improved abaca fiber stripping techniques;
3) Production of improved abaca seedlings;
4) Products development to diversify abaca products such as handicrafts, textiles, paper, and related products;
5) Market development for new abaca products; and
6) Laboratory for tissue culture to improve abaca quality further.

[2] For example, FIDA lists and delists certified abaca traders in order for buyers to easily find appropriate traders.

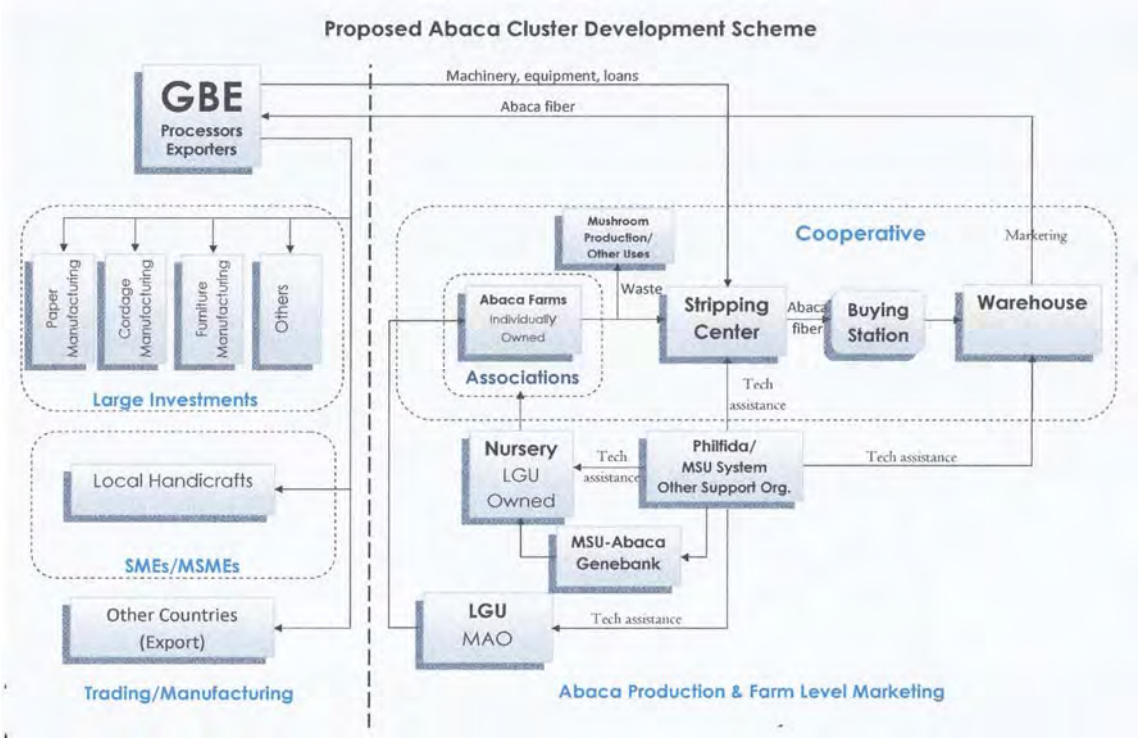


Figure 10.15 Possible Abaca Industrial Cluster Development Scheme

(2) Coco products industrial cluster development project*

There is a growing demand from mining and construction industries for hand-woven geo-nets made from coconut coir, an extracted fiber from coconut husks. The high production cost of geo-nets in the Country is apparently attributable to high labor cost[3] as well as inefficient processing structure with each processing step (harvesting, decortication, twining, and looming) being conducted at a different location. Mindanao accounts for 60% of the current coconut husk supply of the Country while it accounts for only 35% of the Country's coir processing capacity. Bangsamoro, representing 9% of the national coconut production (no data of utilization of husks), has a potential to fill the undersupply of coir from Mindanao with the utilization of unused husks.

The proposed project will support the establishment of an assembly unit for processing activities to integrate the current inefficient processing structure by utilizing Bangsamoro's abundant and relatively cheap labor. Specifically, the project will support the installation of a decorticator with solar-powered twining and looming kits.[4] Coconut peat and dust, residual after extraction of fiber from husks, can be sold to organic farmers as a soil additive or an ingredient to produce organic fertilizer. This project would be a fundamental step to establish coconut coir-based product lines in Bangsamoro with the export of high-value products being expected.

Coconut sugar, processed from boiled saps taken from blossoms,[5] is increasingly drawing health-conscious consumers' attention in developed countries together with its high nutrition. The coconut sugar production of the Country's largest processor located in Cotabato Province cannot meet its growing orders from Europe.[6] Although the high purchase price of coconut sugar has recently led to an emergence of small- to medium-scale coconut sugar processors in Bangsamoro, most of their

[3] The minimum wage per day (in 2013) in the agriculture sector of the Philippines is US$4.8, while that of Sri Lanka at US$2.9 and India at US$1.6. (Source: Department of Labor and Employment (Philippines), Ministry of Labor and Employment (India), and Department of Labor (Sri Lanka).)
[4] A similar set of equipment was installed for the coconut cluster under the Davao Industry Cluster Capacity Enhancement Project (DICCEP).
[5] No nut will be grown afterwards.
[6] The cost of equipment estimated by the processor (Treelife Coco Sugar) to upgrade the monthly capacity from the current 15 tons to 100 tons with additional supply from 250 ha is US$ 1 million (70% for the equipment and the rest for the building).

products do not meet the export standards.

The proposed project aims to encourage the forming of a cluster that produces high value coconut sugar qualified for export. Inconsistencies in quality (texture and color) of coconut sugar have been observed in products sold in domestic markets.[7] In order for local processors to meet the quality standards for export, a systematically controlled process needs to be set up that enables a quick collection of saps, the boiling with water and heat facilities, and the treatment after drying and packaging. As saps are taken in short cycles, the coconut sugar requires more labors in the field than usual coconut cultivation, as well as female labors in processing activities. The project will encourage farmers to purchase a processing unit equipped with a boiler, drier, packager and storage through small-scale credits (i.e. Bangsamoro financing facility). This project would contribute to an increase in wage and employment through the production of a high value product.

(3) Coffee industrial cluster development project

The Robusta variety of coffee, which is used for domestic instant coffee, accounts for most of the coffee produced in Bangsamoro. The value of Arabica variety produced in Bangsamoro is not properly reflected to its prices, with Arabica being even sold mixed with Robusta. Local traders in the Philippines buy high-quality Arabica from their contracted farmers (mainly located in Mindanao) and export to the international market which has stringent quality standards.

The proposed project aims to impart production techniques of highland Arabica to farmers in Bangsamoro and establish sales channels. The project provides partner farmers with techniques for nursery, cultivation with care, post-harvest treatment, and roasting. The location of project would be selected from Wao, Bumbaran, or Buldon in Lanao del Sur with favorable conditions of altitude between 1,000 and 2,000 m and rainfall between 1,500 and 2,000 mm.[8]

The project will also endeavor to link farmers and buyers possibly through contract farming, combined with support from investors in nursery and agricultural inputs. The project will also support the forming of intermediary farmers' groups which will sell a large volume of collected beans to investors/exporters.[9] There is a high possibility that the certification of organic coffee would lead to an increase in farmers' incomes. As a step for the international organic certificate, the project would assist farmers' groups in applying for the National Organic Agriculture Board (NOAB) which provides support and funding under DA.

(4) Rubber industrial cluster development project

Most rubber growers in Bangsamoro are smallholders who cultivate 1.0 to 2.5 ha of rubber intercropped with fruits, such as lanzones, durians, rambutans, bananas and coconuts. There is no primary processing plant in Maguindanao; farmers sell their cup lumps of latex to traders, who then transport them to one of the rubber processing plants in Makilala of Cotabato Province (easily accessible from the production areas in other parts of SOCCSKSARGEN).

The rubber industrial cluster is composed of several sub-systems encompassing production including input, marketing and processing, and possibly export. The input sub-system includes the supplier of fertilizers, agrichemicals, labor and planting materials. The production sub-system comprises farmers, small-holders and plantation. Marketing and processing sub-system include traders and manufacturers. These sub-systems should be supported by government, industry associations, R&D institutions, financial institutions and logistic industry.

Post-harvest handling of rubber is a key to the improvement of farmers' incomes by improving the quality of latex. It is difficult to judge the quality of latex from its appearance once rubber is formed into cup lumps. Mixing impurities (such as sands and metals) inside the cup lumps is reported to be sometimes practiced (and rather prevalent in Bangsamoro), which makes cup lumps appear to contain

[7] JICA (2011), Local Industry Promotion in ARMM
[8] International Coffee Organization, Botanical Aspects (http://www.ico.org/botanical.asp)
[9] Some NPOs, such as Hineleban Foundation (Bukidnon) and Coffee for Peace (Davao), signed contracts with partner farmers to buy beans from and sell beans to buyers (including exporters).

highly consolidated latex (better quality) with its increased weight. Since it is too costly to introduce impurity detectors, raising farmers' awareness through Department of Agriculture (DA) extension services would be indispensable to quality improvement. DA extension services should also include the utilization of high-yield seeds, better care of trees during growing periods, and the improvement of post-harvest handling.

10.4.2 Integrated farming promotion program

(1) Goat-based integrated farming project*

The incentive for intercropping is essentially economic, since this system not only provides higher gross returns per ha but also plays an important role as an insurance against total crop loss. With the marked fluctuations and long term decline in copra and coconut oil prices, the integration of livestock and coconuts is economically increasingly attractive. Traditionally used for weed control in plantations so that coconuts could be located, cattle, sheep and goats are increasingly seen as important parts of the system. There are both advantages and disadvantages in this integration but the latter can be tempered by good practices.

As far as animal production is concerned the provision of shade and thus lower heat loads on animals is likely to have a positive effect on animal productivity. Although there are constraints particularly related to the level of shade under closely spaced coconuts, a number of grass and legume species have been identified which have varying degrees of shade tolerance. Where light transmission is greater than 50%, sustainable grazing of pastures is possible.[10] Nutritive quality of forages grown in partially shaded environments such as old coconuts is comparable to those grown in full sun.[11] King grass can be cultivated under coconut trees as its forage yield is equivalent to 26.3g/day feeding with legumes without affecting the coconut farming.

Goat integrated under the coconut tree does not affect the coconut farming system in the area.[12] Thus, crop livestock system (coconut-forages-goat) is an answer to the scarce supply of good forages (grass and legume) to support the feed requirements of goats. In addition the system produces manure with the feed converted to organic fertilizer. Thus, this supports the optimal growth of pasture and coconut productivity.

According to the survey conducted by the Philippine Coconut Authority (PCA) in 2012, the total area planted to coconut in Bangsamoro is 348,417.8 ha. This total is well-distributed among the five provinces of Maguindanao and Lanao del Sur in mainland Mindanao and the island provinces of Basilan, Sulu and Tawi-Tawi. Rubber plantation areas are about 13,000 ha mostly in Basilan. Native varieties of bananas are in about 27,820 ha. Some coconut planted areas are already intercropped with native varieties of banana and fruit trees. There are also coconut farms intercropped with corn. Notwithstanding, these permanent crop areas provide a vast opportunity for integration with goat production.

The target beneficiaries of the project are cooperatives with a total consolidated coconut and other tree crop plantations area of not smaller than 100 ha and large/commercial plantations of not smaller than 100 ha. In addition to increasing the value of output per hectare of land, the project is intended to create impact by drastically increasing the availability of goat meat and dairy products in Bangsamoro. In order to achieve these goals, the project shall have the following components.

1) Research and development

   Although, there have been sighting of goats raised under permanent crops such as coconuts, large-scale production needs a well-designed farm system that will ensure the success of the project. Constraints and disadvantages can be managed through technology intervention. R&D, which

[10] Ohler, J.G., Modern Coconut Management; Palm Cultivation Products, FAO; www.ecoport.org
[11] Ibid.
[12] Introduction of Improve Forages Under Coconut Trees for Goat D. Polakitan, P. Paat, J. Wenas,O. Tandi, Z. Mantau Installation of Agricultural Technology Assessment and Research, Kalasey North Sulawesi

may be done by the Mindanao State University (MSU) and the University of Southern Mindanao (USM) will develop site-specific farming systems for integration of goat production to coconut, rubber and fruit tree plantations. The farming systems would take in consideration the production of compatible forage crops within the plantation to provide for feeds. Maguindanao and Lanao del Sur have an advantage of more than 2,500mm well-distributed rainfall annually to provide for a year round forage for the goats. Still, the systems should incorporate measures to counter the disastrous effects of droughts. It should also ensure that productivity of the permanent crops is not adversely affected. Farming systems will also be designed for halal goat production

2) Financing

The project will include a financial package to eligible project proponents. This financing package will be designed to answer the need for initial investment requirements and working capital. Financing will be implemented as a loan program administered by the Land Bank of the Philippines and the Development Bank of the Philippines.

3) Promotion

The agriculture agency of Bangsamoro will establish an information drive for the project. Model farms or small-scale farms may be established for better appreciation of target project participants.

4) Market assistance

Since the project is directed towards commercial production, there is a need to create markets not only in Bangsamoro but nationwide and even export. Hence, the project would include a market development assistance component that would respond to the need of the project participants.

(2) Poultry-based integrated farming project

Many benefits from increasing production and value of the land to reduction in production cost could be obtained in integrated farming systems. These integrated farming systems have already been tried in multiple storey cropping of coconut, coffee and vegetables and livestock under some permanent crops. Livestock, forage and coconut can also be integrated. All these farm systems integrating production of several crops and livestock have been successful in creating added income to the farmers and increasing the value of agricultural outputs per unit area of land.

Poultry could also be raised in an integrated farming systems as in the case of rice-duck farming system already practiced. Rice/duck integration makes a symbiotic relationship good for land efficiency. Raising ducks entail having ponds of water being part of their natural habitat. Ponds can be replaced by the rice fields, which are watery for most of the growing period of rice plant and a period during land preparation.

Rice paddies all over the Philippines are so infested with snails that destroy rice at the growth stage. Ducks eat snails, which provide protein and other nutrients so that they provide a natural pest control measure. Duck droppings can provide fertilizer to the rice paddies. For commercial-scale production, the farming system will have to be designed for entire requirements of ducks and rice from the knowledge that rice farming will necessarily have to be on dry land for a period while ducks will continually need water to swim.

Native chickens can also be raised in orchards like mango farms. Chickens naturally ward off insects in the mango farm as they graze on grasses and feed on insects that hide under the grasses. Mango farms are regularly sprayed with pesticides but there are experiences that showed chickens are not affected. In mango farms in South Cotabato, regular spraying of chemical pesticides is practiced but no injury has ever been detected on the chickens in the farms. In other mango farms, chickens feast on the insects dropping immediately after spraying without any symptom of poisoning.[13] The orchard/native chicken integration is appropriate for Bangsamoro condition since the market prefer native chicken and farmers are more attuned to this culture.

[13] Bareja, B. G. and Sioquim E. M., More Efficient Mango Production thru Integrated Production System, 2010 www.cropsreview.com

In order to achieve these goals, the project shall have the following components.

1) Technical assistance

   The project will consist of technical assistance for the farmers for the proper integration of the type of poultry and crop integration (e.g., duck-rice and chicken-mango). DAF will be capacitated to have a pool of trained technicians to assist farmers in setting up the integrated farming systems and continually provide technical support. Technologies and technical experts will be sourced from the State Universities and Colleges (SUCs), particularly USM, which has already developed various farm systems.

2) Financing

   The project will include a financial package to eligible project proponents. This financing package will be designed to respond to the need for initial investment requirements and working capital.

3) Promotion

   The agriculture agency of Bangsamoro will establish an information drive for the project. Model farms or small-scale farms may be established for better appreciation of target project participants.

10.4.3 Mixed farming diversification program

(1) Plantation crops mixed farming project

Coconut trees occupy the largest areas of plantations and have been in the area for decades. Rubber plantations, which gained dominance in the early 1960s are a plenty in Basilan. Many of these plantations have already been awarded to agrarian reform beneficiaries (ARBs) under a CLOA. There are ARBs under one CLOA which formed a cooperative to continue the operation of the plantation as it was a profitable business of the previous owner. Some ARBs prefer to have the plantations subdivided and get individual titles. Some coconut farms are retention limits of CARP and farmed by long time owners (probably inherited from ancestors).

According to the survey conducted by PCA in 2012, the total area planted to coconut in Bangsamoro is 348,417.8 ha. This total is well-distributed among the five provinces of Maguindanao and Lanao del Sur in mainland Mindanao and the island provinces of Basilan, Sulu and Tawi-Tawi. Rubber plantation areas are about 13,000 ha mostly in Basilan. Some coconut planted areas are already intercropped with native varieties of banana and fruit trees. There are also coconut farms intercropped with corn. There have been some sightings of coconut intercropped with sugarcane.

In terms of value of production, coconut, coffee and corn generate the lowest value per hectare out of the top 10 crops of Bangsamoro. In order to increase farmers' income per hectare of land, these crops should be integrated with other crops of higher value creating a mixed cropping system. Mixed cropping systems give farmers security in income since plantation crops are traded commodities subject to fluctuation of prices. This is true in the case of rubber and copra.

This project will consist of a package of assistance including technology and financing and product marketing for participating farms. It will be implemented by a consortium consisting of the following.

1) Bangsamoro's Department of Agriculture as lead agency
2) The University of Southern Mindanao (USM) or other appropriate SUC

   The USM is executing farming systems under its regular agriculture instruction and R&D program. Mixed cropping systems will have to be developed on a case-to-case basis considering soil suitability, complementarity of the crops to be integrated, and other factors.

3) The Land Bank of the Philippines (LBP)

   Financing for the project will be managed by LBP, which will either be a low-cost to no-cost loans for participating farms depending on criteria that will be established under the project.

4) Agriculture Marketing Assistance Division of the Department of Agriculture

The Division will help participating farms identify markets for new products.

(2) Mixed field crops farming project*

Mixed cropping, also known as inter-cropping or co-cultivation, is a type of agriculture that involves planting two or more of plants simultaneously in the same field. It is often perceived as a viable tool to increase on-farm biodiversity in organic agriculture and is a potentially important component of any sustainable cropping system. In general, the theory is that planting multiple crops at the same or almost the same time will allow the crops to work together. Possible benefits of mixed cropping are improvement of soil fertility management, keeping down weeds and insect pests, resisting climate extremes (wet, dry, hot, cold), and suppressing plant diseases. In this sense it can be seen as performing different eco-services in the farm system.[14] All these are expected to lead to increase in overall productivity and to the use of scarce resources to the fullest degree.

There are several models of mixed-crop farming systems that combine two or more crops in the same area of production. The choice of crop combinations is based on the characteristics of each crop from which all can mutually benefit. For example, crops should not have the same kind of pest or disease or compete for soil nutrients.

There are also such farm systems that take the most of benefits from combination of crops. The classic example of mixed cropping is the combination of corn, beans and squash. All three seeds are planted in the same hole. Corn provides a stalk for the beans to climb on, the beans are nutrient-rich to offset that taken out by the corn, and the squash grows low to the ground to keep weeds down and water from evaporating from the soil in the heat.[15]

Another farm system is called relay cropping best explained in the case of tomatoes and bitter gourd planted in the same plot. Tomatoes are planted ahead and bitter gourd planted as soon as tomatoes are in the flowering stage. This timing allows harvesting period for tomatoes before the vine of bitter gourd climbs up to the trellis and deprive tomatoes with sunlight when harvest is over. In a few weeks, harvesting of bitter gourd starts.

There are various types of crop combinations and farming systems but they should also be adapted to the conditions of specific areas. Moreover, in the choice of crops, the market must be considered. Thus, the project will entail a research, development, and extension (RDE) component to examine and determine various crop cultures and farm systems suitable for Bangsamoro. Different combinations of crops may work differently in different places.

Agronomists studying mixed crops have had mixed results on yield difference between mixed and monoculture cropping. For example, a combination of wheat and chickpeas may work in one part of the world but it may not in another. However, overall it appears that there are measurably good effects when the right crops are cultivated together.

Farm systems-based cropping by mixed farming as against commodity-based cropping may expand opportunities to incorporate under-utilized crops into farm systems. These crops include turmeric, *sakurab* (leeks), chayote, mushrooms, and garlic. Another possible crop is *Moringa oleifera*, which has multiple uses with leaves, pods and kernels, and roots. This plant may be part of mixed farming or constitute another industrial cluster. Further research should be conducted on the multiple use of this plant.

(3) Open pollinated seed production center establishment*

Mixed farming is a method to increase agricultural productivity without depending on expansion of agricultural land, but its effectiveness depends on productivity of selected crops to be combined. Bangsamoro has already well diversified crops that fit to local conditions, but the production increase of best crop varieties is constrained by availability of seed. Also, further research is required to develop

[14] The use of mixed species cropping to manage pests and diseases – theory and practice, Birgitta Rämert Department of Ecology and Crop Production Sciences, Swedish University of Agricultural Sciences, Box 7043, SE 750 07 Uppsala, Sweden.
[15] Mixed Cropping-History of Ancient Farming Technique, www.archaeoloy.about.com

varieties to produce quality products.

SUCs play key role in the provision of research, development and extension (RDE) services for the growth of the agriculture sector in the Philippines. Along with instruction, they are tasked to undertake research and development. Fortunately, Bangsamoro has rich resources for agricultural research and development, which should be utilized to enhance the key sector of the Bangsamoro economy.

The Mindanao State University (MSU) System is the only university in the Philippines with a special mandate of integrating the cultural communities, especially the Muslims into the mainstream of the nation's socio-cultural and political life. It has multi-regional service areas. Its 11 collegiate campuses are located in eight provinces and four out of the six regions in Mindanao. Of the 11 campuses, five are located in the Bangsamoro region; the main campus and MSU-LNCAT in Marawi City, MSU-Maguindanao in Dalican, MSU-Sulu in Jolo, and MSU Tawi-Tawi in Bongao. Each of the campuses including those in other regions offers courses in agriculture and fisheries.

The University of Southern Mindanao (USM) has a research function geared towards discovery and expansion of science knowledge and development of appropriate technologies for its clientele through collaborative and interdisciplinary R&D activities. The USM Research and Development Office (USM-RDO) coordinates all research activities in the university, establish research priority areas consistent with the priority areas of the region and the national government, evaluate research proposals and endorse to funding by USM and other agencies. USM operates two national research centers: the USM Agricultural Research Center (USMARC) for corn and fruits, and the Philippine Industrial Crops Research Institute (PICRI) for rubber, cacao, coffee, spices and essential oil-bearing crops, fiber crops, oil crops and other industrial crops.

These existing universities and research centers should be utilized to support the production of quality seed and development of crop varieties best suited to local conditions in Bangsamoro. Specifically, an open pollinated seed production center should be established with collaborative efforts of the existing agricultural institutes including MSU and USM. A seed bank may be attached to the center to fill in the seasonal and locational gaps in seed supply throughout Bangsamoro.

10.4.4 Innovative production and distribution program

(1) Halal industry promotion project*

To promote the halal industry in Bangsamoro, it is necessary to create a promotion center for controlling halal certification and quality of local food products under the Bangsamoro government. The project will establish Halal Industry Promotion Center (Component 1) at a proper place and train local officials to be able to certify local food products properly (Component 2).

Component 1: Establishment of halal industry promotion center (HIPC)

The HIPC will be equipped with three facilities: (1) a halal-certified laboratory for analysis of ingredient and nutritional composition, (2) a hygiene control laboratory for quality control of local products, and (3) a food-processing experimental factory for development of new local agro-fish foods in the Bangsamoro region, which should also serve as a center for training in food processing.

The HIPC should be established as a financially and administratively autonomous entity to be operated by the private sector involving the local Chamber of Commerce and Industry, LGUs, and universities under the supervision of the Bangsamoro government. To make it financially autonomous, fees for halal certification, laboratory tests, entrusted processing, and other works should be properly determined and managed. The HIPC may operate a mobile halal food production techno-clinic as part of agricultural extension works.

Halal testing laboratory at DOST-ARMM in Cotabato City. It was established by JICA assistance in 2010.

The laboratory has necessary equipment for halal testing analysis except gas chromatography. Basic analysis for halal certificates can be managed without alcohol content.

Photo 10.1 Existing Halal Testing Laboratory in ARMM

<u>Component 2: Technical cooperation on food quality analysis and local food-processing development</u>

The project will train the research staff engaged in the HIPC to enable to analyze local food quality and hygiene condition and develop new processing foods by local materials. Finally, the HIPC will have the capacity to issue food security certificates as well as halal certificates.

HIPC has chemical and micro-biology laboratories to analyze food quality and hygiene condition (the photo in Food Development Center in Manila).

HIPC also has an experimental food processing factory to develop new local processing products (the photo in Food Development Center).

HIPC produces food samples in the experimental factory with local public or private sectors.

Photo 10.2 Food Development Center in Manila

(2) Organic agriculture promotion project

Organic farming is expected to ensure and cumulatively condition and enrich the soil fertility, increase farm productivity, reduce pollution and destruction of the environment, prevent depletion of natural resources and protect the health of the farmers and of the general public. Moreover, organic agriculture provides an opportunity for the Country's organically grown commodities enter the world market, which has the total value worth US$40 billion to 70 billion in 2012.[16] The Country is set to go all natural in agriculture through Republic Act No. (RA) 10068 that aims to strengthen the state's policy to promote, propagate, develop further and implement the practice of organic agriculture.

Despite all the advantages, according to pundits, the local farming community is yet to totally embrace organic agriculture. The tedious task and high production cost has discouraged farmers to shift into organic farming. "Going organic" involves a considerable amount of investment and time. First, the soil must first be analyzed for rehabilitation to determine the exact nutrients needed and other recommendations for soil improvement. Second, land preparation should eliminate the use of herbicides and instead adopt using the grass cutter or manual pruning to plow and pulverize the soil and prevent grass from growing. Third, soil should be reconditioned by using vermin-casts or composts using earthworms to allow the garden to rest for at least a month from the chemicals. Certifying bodies should check that seedlings/seeds are totally free of synthetic inputs and other inputs totally free from

[16] Organic Farming: The Future of Philippine Agriculture, www.fareasternagriculture.com

chemicals.[17]

All the trouble of going organic will still entice farmers if there is market for organic products. Thus, marketing needs to raise consumer awareness. There is much to be gained in enhancing the labeling, standards and certification of organic products and byproducts to sustain ecological agriculture. With a concrete labeling system with clear government check mechanism for the validity of labels, the promotion of organic products and byproducts would boost trading system that would benefit more consumers and producers. This means developing labels and standards that range from organic, semi-organic, organically grown, naturally farmed, pesticide free or less chemicals. Appropriate labels will provide consumers appropriate food information and proper guidance. Likewise, certification processes should be attuned to the interest of small farmers to make it more economical to go into organic farming.[18]

Since the project objective is to increase the number of farmers adopting organic farming, the project will have three components: training program, model farms, and marketing.

1) Establish a training program for organic farming and marketing of organic products

   The training program will accommodate farmers who are curious and want to know more and those who would like to learn about organic farming, the benefits not only as an income earner but wider scope of consumers health and environment. There will be courses on various organic farming systems, methods of pest control and management, and production of organic fertilizers. In order to learn ropes of marketing organic products, there will be courses on certification of farms and labeling of products.

2) Establish model organic farms for production of vegetables, rice, corn, livestock, poultry, etc.

   The most effective way to showcase an organic farming is to put up demonstration farms operating as a business. This project will establish model farms for various farming systems to showcase production and marketing. These farms will be actual farms and will be implemented together with a farmer or cooperative operating each farm with all the technical guidance by technicians and consultants for free. The following components are involved.

   a) Identification of host farmers/cooperatives

      Selection process will be based on some criteria to be established by the consortium. Initially, one of the requirements is ownership of land or holder of a lease agreement or any instrument that would ensure continuity of operation for the length of cooperation.

   b) Technical assistance – provision of technicians and consultants for production of specific products, design of the farms (what to plant, choosing crop combinations), practices on growing and harvesting, natural pest control, production of organic fertilizers, postharvest processing and compliance to the requirements of organic farm certification.

   c) Provision of credit

      Aside from owning a piece of land, the farmer/cooperative cooperator will provide for some production inputs, which will be determined under the project. The farmer/cooperator will be provided production credit line with LBP from which the cooperator may avail as he sees necessary.

3) Assistance on entering the distribution system for organic products

   The consortium will assist an entity in Bangsamoro to be accredited as an organic farm certification body to lessen the cost of organic farm certification. It will also put up a website of Bangsamoro organic farms and producers that will provide information for prospective clients such as hotels, markets, and restaurants.

The project will be implemented through a consortium consisting of DAF, ATI, SUCs, and LBP. DAF will be the lead implementing agency, ATI will undertake the training component. SUCs will provide

[17] Eco-Environment, Philippines
[18] La Liga Institute

technical expertise in designing and providing technology and technical assistance to organic farms. LBP will undertake the credit component.

(3) Open market establishment project*

The Bangsamoro area has already hosted a number of agri-business corporations like La Frutera in Datu Paglas, and Agumil in Buluan, both in Maguindanao, BJ Coconut Mill in Indanan Sulu and Mt. Kalatungan in Bumbaran and Matling in Malabang, both in Lanao del Sur. With further opening up of the Region to investments, more businesses will be established. Like the ones that are already established, the Region is likely to attract more agri-businesses like plantations and agro-processing companies, which will naturally be places where people would congregate. First, these companies will employ hundreds to thousands of workers because agro-industries are labor-intensive. Second, the up-stream and down-stream industries that will be created by the companies will add more people in the area.

In the meantime, product diversification is being encouraged in the Region especially for small farmers to have multiple sources of income. Currently, DAF under various programs of the Government are promoting planting of vegetables by distributing planting materials and other inputs supported by technical assistance. The same is being promoted by the CD-CAAM, which has established demonstration farms for vegetable production in the municipalities of Sultan Mastura, Maguindanao, and Matunggao, Lanao del Sur.

For the farmers to continue planting, a market infrastructure should be provided for them where they can bring their produce for the people/consumers who can buy directly. These are farmers' markets and are already common in developed countries because small farmers are given space to sell their products at good prices directly to consumers who benefit from fresh produce and lower prices because one layer of agriculture production distribution (middlemen) is eliminated. Locally, these are also practiced in Makati as the weekend market.

The project will entail cooperation of the large companies locating in Bangsamoro to be facilitated by the regional government and DAF. A company may provide the site and infrastructure as its corporate social responsibility (CSR) project, which would provide them tax credits or tax exemptions. Operation and maintenance of the market may be a shared responsibility of DAF and the company particularly on peace and order, upkeep of the facilities and policing the participants in the market. It will have established rules on qualification of farmer/sellers and basic rules of conduct, e.g., management of market wastes. Initially, the rules should establish that the market is only for products planted by the farmers or their families as sellers. Whenever applicable, the company may also participate in selling its product. It is one way for the local people to get to know the company's product especially when destinations are export markets.

10.4.5 Fishery products processing and distribution program

(1) Cold chain facilities installation project*

Due to lack of cold chain facilities and system, the majority of local fish caught in the Bangsamoro region cannot be distributed to outside markets as fresh and frozen products. At present, most of locally produced fish is processed to salted and dried fish. By establishing cold chain facilities, a large amount of locally produced fish can be distributed to outside markets and processing factories as fresh and frozen fish.

The project will install cold storages and ice making plants at major fish ports to increase the distribution capacity of fresh and frozen fish. The candidates of fishing ports and fish landing places for the cold chain installation are Parang in Maguindanao, Malabang and Picong in Lanao del Sur, Lamitan, Malsu and Sumisip in Basilan, Joro, Parang and Mainbang in Sulu, and Bongao, Languyan, and Pangila-Sugala in Tawi-Tawi. Because Malabang and Picong do not have any plans of fishing port construction at present, the project will establish new fish port facilities at both places. In other candidate municipalities, local fishing port facilities already exist or will be constructed until 2016 in the plan. The project will introduce additional cold storages and ice making plants to expand the capacity of fresh

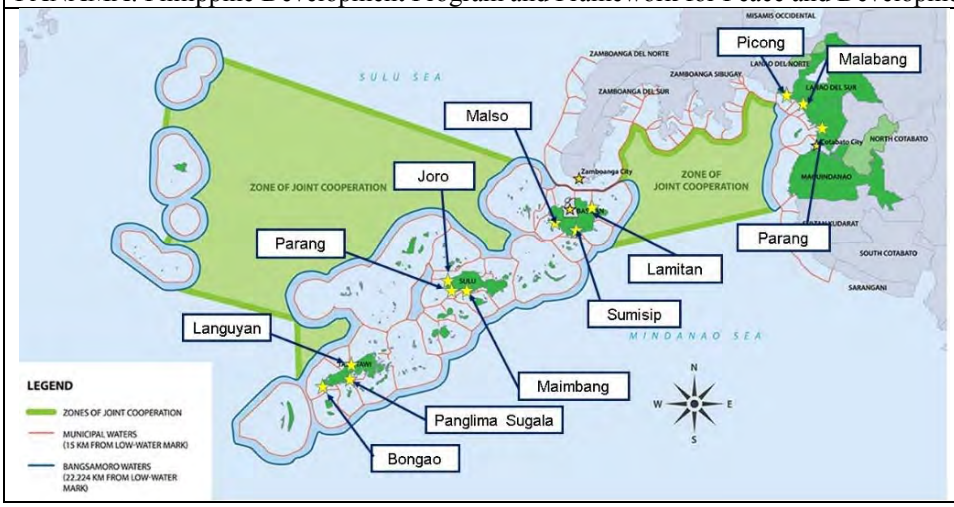
fish distribution at target places.

The present conditions of major fishing ports and fish landing sites in Bangsamoro and necessary measures for those existing facilities are summarized in Table 10.7.

Table 10.7 Present Conditions of Major Fishing Ports and Fish Landing Places in Bangsamoro and Necessary Measures

Province	Municipality	Present Condition (2015)	Necessary Measures
Magundanao	Parang	Landing pier and fish market (by USAID)	Renovation of fish landing facility and installation of ice plant and cold storage
Lanao del Sur	Malabang	Small fish landing hut (by ARMM social fund)	Construction of new fish landing complex with ice plant
	Picong	Small landing pier (by Municipal LGU)	Construction of new fish landing complex with ice plant
Basilan	Lamitan	Under-construction of fish landing, market and ice plant (by PFDA)	Introduction of additional ice plant and cold storage
	Malso	Fish landing and market (by PFDA)	Renovation of fish landing and cold chain facilities
	Sumsip	Under-construction of fish landing and market (by PFDA)	Renovation of fish landing facility and installation of ice plant and cold storage
Sulu	Joro	Old fish landing and market (by Provincial LGU), and ice plant (by BFAR)	Renovation of fish landing facility and installation of additional ice plant and cold storage
	Mainbang	Fish landing, market and ice plant (by Municipal LGU)	Installation of additional ice plant and cold storage
	Parang	Under-construction of fish landing, market and ice plant (by PFDA)	Installation of additional ice plant and cold storage
Tawi-Tawi	Bongao	Old fish landing and market (by Provincial LGU) and ice plant (by private)	Renovation of fish landing facility and installation of additional ice plant and cold storage
	Pangila Sugama	Under-construction of fish landing, market and ice plant (by PFDA)	Installation of additional ice plant and cold storage
	Languyan	Under-construction of fish landing, market and ice plant (by PANAMA)	Installation of additional ice plant and cold storage

Note: PFDA: Philippine Fisheries Development Agency
PANAMA: Philippine Development Program and Framework for Peace and Development



Major fishing ports and fish landing places for renovation, and expansion of cold chain facilities for local fish products in Bangsamoro region.

Figure 10.16 Target Sites for Construction and Renovation at Major Fishing Ports in Bangsamoro

Ice making plant at Cotabato City (operated by Cotabato Light Co.)

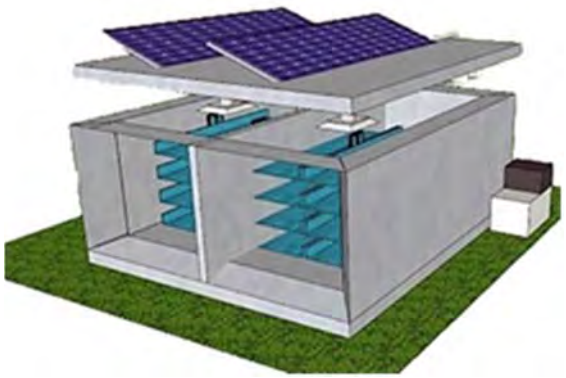
Star-style piers adapting for local fishing boats/canoes at Karamasing, Sultan Kudarat Province

Fish landing and market facilities at General Santos Fishing Port

Photo 10.3 Construction and Renovation of Fishing Port Facilities

(2) Solar-powered fish market development project

The project will install small-scale fish market facilities at local fish landing sites as local focal points of fish distribution to major fishing ports above-mentioned. In principal, a fish market facility will be established at each coastal municipality. Due to lack of public electricity supply in rural areas, a solar power unit should be installed to operate small cold storages for temporal preservation of fresh fish and ice making. Local fisher associations and cooperatives will also be organized to manage the fish market facilities and the solar-powered cold storages. The fish market facilities can be also utilized for fish processing activities at local communities.



Reference: https://www.robotix.in/

Reference: http://www.ecozensolutions.com/

Photo 10.4 Installation of Solar-powered Cold Storage

A fish market / processing facility at Matium, Sarangani Province. Local fisher women group manages it. It is a good model of local fish market facility in Bangsamoro region.

A fish processing facility is equipped in the market building.

Local fisher's women sell their processing fish products to local people and visitors at the market.

Note: Matium Municipality in Sarangani Province.

Photo 10.5 Small-scale Fish Market and Processing Facility

10.4.6 Aquaculture development program

(1) Fresh water aquaculture development project

<u>Component 1: Establishment and renovation of freshwater fish and prawn hatcheries</u>

To produce and supply a sufficient amount of freshwater fish and prawn seeds, local freshwater aquaculture centers should be established in target areas (Figure 10.17). The two existing freshwater fish hatcheries operated by BFAR-ARMM (Datu Odin Sinsuat in Maguindanao and Marantaro in Lanao del Sur) will be renovated to increase the capacity of fish seed production. Additionally, a new freshwater fish hatchery should be also established in the eastern side of Lake Lanao. Masui is a proper site of a new freshwater fish hatchery. The hatcheries of freshwater prawn should be established at coastal areas, because, sea water is necessary to produce the prawn seeds. The coastal areas of Datu Odin Sinsuat in Maguindanao and Malabang in Lanao del Sur are the proper places for the construction of prawn hatcheries. These freshwater prawn hatcheries can be utilized for seed production of brackish-water species, such milkfish or mud crab.

A construction and renovation plan of existing or new hatcheries for fresh water aquaculture is shown in Figure 10.18 and summarized in Table 10.8. Potential species for fresh water aquaculture are described in Table 10.9.

Figure 10.17 Pontential Areas for Freshwater Aquaculture Development in Bangsamoro Region

BFAR-ARMM freshwater fish hatchery at Datu Odin Sinsuat located on MSU-Manguindanao campus, producing only tilapia seeds

BFAR-ARMM freshwater fish hatchery at Marantaro in Lanao del Sur with outmoded facilities, producing tilapia and common carp seeds

Community-based MSU-Maguindanao multi-species hatchery in Datu Odin Sinsuat, which may be innovated to freshwater prawn hatchery in future

Photo 10.6 Existing Hatcheries Possibly Renovated for Freshwater Aquaculture Development

BFAR-ARMM Freshwater fish hatchery at Marantaro, Lanao del Sur

Experimental fish cages in Lake Lanao at Masiu, Lanao del Sur

Photo 10.7 Potential Areas for Freshwater Aquaculture Development in Bangsamoro

Figure 10.18 Establishment and Renovation of Freshwater Fish/Prawn Hatcheries in Maguindanao and Lanao del Sur

Table 10.8 Construction and Renovation Plan of Existing/New Hatcheries for Freshwater Aquaculture

Existing/planned hatcheries	Place (municipality, province)	Program content	Target species
BFAR-ARMM Freshwater Fish Farm (existing)	Datu Odin Sinsuat Maguindanao	Innovation/expansion of existing facilities	Tilapia
BFAR-ARMM Freshwater Fish Farm (existing)	Marantao Lanao del Sur	Innovation/expansion of existing facilities	Tilapia, common carp
Freshwater Fish Farm and Hatchery (newly planned)	Masiu Lanao del Sur	New construction of fish ponds and hatchery	Tilapia
MSU-Maguindanao Marine Multi-Species Hatchery (existing)	Datu Odin Sinsuat Maguindanao	Innovation/expansion of existing facilities	Freshwater prawn, other marine species (milkfish, mud crab)
Marine Multi-species Hatchery (newly planned)	Malabang Lanao del Sur	New construction of ponds and hatchery	Freshwater prawn, other marine species

Table 10.9 Potential Species for Freshwater Aquaculture in Bangsamoro

Tilapia	Tilapia is the most popularly consumed freshwater fish in the Philippine. The basic technique of tilapia culture is simple for local farmers. The white meat of tilapia is highly valued in EU and USA, because a shortage of a supply of local white fish meat. Tilapia filets will possibly be one of promising commodities exported from the Bangsamoro region.
Freshwater prawn	Freshwater prawn is one of high-value species in domestic market. Basic techniques in fresh-water prawn culture are not so difficult for local farmers, compared to marine shrimps. Farmed freshwater prawn can be transported alive to major local markets, such as Davao, Cebu, and Manila by land or air.

Component 2: Technical cooperation and extension of freshwater fish and prawn culture

The technical cooperation project for the extension of freshwater aquaculture will be carried out in collaboration with local academic resources such as Mindanao State University at Maguindanao and Naawan, which has the Faculty of Fisheries. The project will train Bangsamoro government and LGU's officials and local community leaders for extension personnel, and create the extension structure and system on freshwater aquaculture development in the Region. Additionally, the project will also introduce and advise the processing activities of tilapia and freshwater prawn to be marketed at outside market. Especially, tilapia filet is a lucrative commodity to be exported to overseas market.

(2) Marine culture development project*

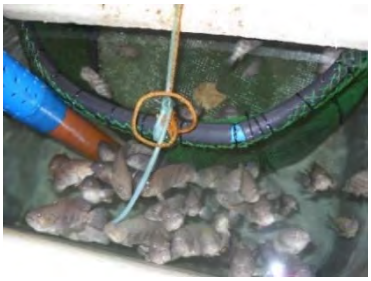
Component 1: Establishment and renovation of multipurpose marine hatcheries

To produce and supply a sufficient amount of fish, abalone, and sea cucumber seeds, a multipurpose marine hatchery should be established in each island province. At present, BFAR-ARMM has only one multipurpose marine hatchery at Lato-Lato, Bongao in Tawi-Tawi for grouper and abalone seeds. The facilities and equipment of the existing marine hatchery will be renovated to increase the capacity of seed production and handle other species for seed production. The similar marine multipurpose hatcheries should be also established in other island provinces, Sulu and Basilan. Jolo in Sulu and Lamitan in Basilan may be the proper sites of new marine hatcheries in collaboration of Mindanao State University at Sulu and Basilan. Potential species for marine aquaculture are described in Table 10.10.

Table 10.10 Potential Species for Marine Aquaculture in Bangsamoro

Grouper	Grouper is one of most high-valued fish at local and regional markets. Many local people have already started cage culture of groupers at coastal areas; however, they collect and grow their wild seeds. The collection of wild seeds affects the grouper natural stock seriously. At present, the BFAR-ARMM Tawi-Tawi Hatchery is able to produce only green grouper (*Epinephelus coioides*) seeds artificially.
Abalone	Local abalone (*Haliotis asinine*) is a high-valued shellfish at local and regional markets. Even though the BFAR-ARMM Tawi-Tawi Hatchery is able to produce abalone seeds regularly, its culture skill has not been extended well in island provinces. Only small numbers of local people conduct abalone culture in cage. There is a difficulty in harvesting a sufficient amount of naturally grown seaweed for feeding abalone (*Gracilaria spp.*) in island provinces.
Sea cucumber	Recently, a lot of trials and pilot projects of sea cucumber propagation have been conducted in the Philippines. In terms of a local species of sea cucumber (*Holuthuria scabra*), the artificial technique of seed production has been already established. In case of sea cucumber, the seeds are ranched at protected areas, and naturally propagated under a monitoring and surveillance by local communities.

BFAR-ARMM Multi-Species Hatchery at Bongao, Tawi-Tawi


Tawi-Tawi hatchery produces green grouper seeds.


Tawi-Tawi hatchery also produces abalone seeds.

Photo 10.8 Activities of BFAR-ARMM Tawi-Tawi Marine Multi-species Hatchery


Broodstock tanks


Water reserve tank


Seed rearing tanks

Note: Hatchery newly constructed in 2015 by Mega Fishing Corporation in Zamboanga.

Photo 10.9 Marine Multi-species Hatchery Facilities

<u>Component 2: Technical cooperation and extension of marine culture</u>

The technical cooperation project for local extension of marine culture will be carried out in collaboration with the Faculty of Fisheries at Mindanao State University at Tawi-Tawi, Sulu, and Basilan. The project will introduce and develop the seed production methods of high-value marine species such as grouper, abalone, and sea cucumber, and train Bangsamoro officials and local community leaders for extension personnel to create the extension structure and system on marine culture in the Region. Additionally, the project will also introduce and develop the processing activities of abalone and sea cucumber to be marketed at outside market. Especially, dried abalone and sea cucumber are lucrative commodities to be exported to overseas market.


Cage culture for groupers and lobsters at Parang, Maguindanao. Local farmers collect wild seeds, and grow them in cages.


Cage culture for abalone at Samal island, Davao. *Glacilaria* seaweeds are fed for abalone in cages.


Artificially produced sea cucumber seeds at MSU-Naawan, Misamis Oriental. The seeds are ranched at coastal areas, and naturally propagated.

Photo 10.10 Marine Aquaculture Development Programs in Mindanao

(3) Seaweed culture development project

The ARMM makes the largest production of seaweed in the Philippines. Large potential areas for seaweed culture still remain in the island provinces. The project will promote to extend seaweed culture at new potential areas in the island provinces, Tawi-Tawi, Sulu, and Basilan.

<u>Component 1: Installation of sun-dryer's platforms and dried seaweed storages at potential areas</u>

To increase the seaweed production and improve the quality of dried seaweed, the sun dryer's platforms and storages of dried seaweed will be installed at the coastal areas in potential areas of seaweed. It is ideal that each seaweed grower group will manage a sun-dryer's platform on the sea and a seaweed storage at a landing site. In addition, local farmers can also culture fish and abalone in net cages under sun-dryer's platforms. Approximately 100–200 platforms and storages for seaweed culture will be installed at proper culture sites in each island province.

<u>Component 2: Technical cooperation and extension of seaweed culture</u>

A technical cooperation project for the extension of seaweed culture will be conducted in collaboration with local universities, Mindanao State University at Tawi-Tawi, Sulu, and Basilan. The project will introduce and develop seed nursing skills to maintain healthy and strong strains of seaweed for culture purpose, and train Bangsamoro government officials and local community leaders for extension

personnel to make an extension structure and system on seaweed culture in the island provinces. Additionally, the project will also introduce the processing activities of dried seaweed in higher quality to be marketed to local carrageenan factories or exported to overseas. In the project, small-scale model plants of seaweed dried chips are also tried to be operated.

Solar seaweed dryer platforms are constructed on the sea to avoid mixing dried seaweed with sands. (Sitangkai, Tawi-Tawi)

Solar seaweed dryer platform and storage built on the coast (Parang, Sulu)

Drying harvested seaweed on a dryer platform on the sea (Samal island, Davao)

Photo 10.11 Seaweed Drying Platforms in Mindanao

Seaweed tissue culture laboratory at BFAR-ARMM (Cotabato City) with high-quality seaweed strains

BFAR-ARMM processing plant for dried seaweed chips in Parang of Maguindanao (operation suspended due to high processing cost)

Dried seaweed chip sample produced at BFAR-ARMM processing plant, which requires sufficient electricity and fresh water

Photo 10.12 Seaweed Tissue Culture Laboratory and Dried Seaweed Chips Processing Plant

10.5 Enhanced Resources Management Initiative

10.5.1 Forest and watershed management program

(1) National greening program enhancement project*

DENR is promoting tree planting in the whole country under the National Greening Program (NGP). The NGP in the ARMM is covered by an agreement between DENR and ARMM with an aim of reforesting 2,500 ha in the five provinces, namely, Lanao del Sur, Maguindanao, Basilan, Sulu, and Tawi-Tawi.

However, some planted trees do not grow very well due to lack of maintenance. Planted trees usually need maintenance work such as weeding, inspection, replacement, etc. to grow properly for the first 2–3 years. This is not usually done because of lack of personnel and budget.

Therefore, the suggested way of maintenance is to make a contract with nearby barangay for maintenance work by residents of the barangay. Usually one person can cover 4.0 ha of forest area, which costs PHP 6,000 per month. If 1,000 ha will be covered each year for the whole period by the maintenance work for three years respectively, the total cost is PHP 54 million.

For the NGP and other ongoing forest management agreement and rehabilitation programs, monitoring and evaluation of nurseries[19] are important. At present, however, there is no proper nursery

[19] Seedling nursery is a nursery in which to raise only seedlings. Then, seedlings are moved to a transplant

management due to lack of experts. Therefore, assignment of about 10 experts after training is proposed. Required costs are summarized in Table 10.11.

Table 10.11 Costs of Nursery Monitoring and Evaluation

Cost item	Calculation	Amount (PHP)
Training	PHP 200,000 x 10	2,000,000
Monthly fee for experts	PHP 10,000/month x 12 x 7 years x 10	8,400,000
Travel by the experts	PHP 100,000 x 7 years x 10	7,000,000
Total		17,400,000

(2) Bamboo planting project

Bamboo is useful for protection from flood, erosion and landslide because it has underground stems and is deeply rooted. This can protect the river banks, lake banks, etc. Bamboo can be used to make cages, baskets or other bamboo products, after cutting. Bamboo is already planted on some banks of rivers and lakes, but more bamboo planting is recommended. Maguindanao is an area that has many rivers, and needs more extensive bamboo planting. The project costs are summarized in Table 10.12.

Table 10.12 Costs of Bamboo Planting Project

Cost item	Calculation	Cost (PHP)
Preparation of ready-to-plant material (RPM)	PHP 100/RPM x 500 RPM/ha x 100 ha	5,000,000
Growing and maintenance (4 ha/person)	PHP 6,000/month x 36 months x 25	5,400,000
Other expenses (tools, transport, fertilizer, etc.)		5,600,000
Total		16,000,000

(3) Dimapatoy watershed management project

The Dimapatoy watershed is serving as the source of potable water for Cotabato City, Datu Odin Sinsuat and the nearby municipalities, but the water tends to suffer from shortages recently, and proper watershed management is required to solve the problem. Dimapatoy is a barangay in the province of Lanao Del Sur, located just east of Lake Lanao, with 773 residents.

Watershed reserves are designated by DENR, and one of the reserves in ARMM is Lake Lanao watershed preservation with 1,894 ha. However, persistent abuse through logging and pollution has significantly degraded its water quality of the Lake. The Dimapatoy watershed is part of the Lake Lanao watershed preservation, therefore, proper management of the Dimapatoy watershed is expected to lead to protection of Lake Lanao.

The project consists of the following activities in two phases:

Phase 1:

- Delineation of Watershed of Dimapatoy
- Preparation of occupants inventory
- Formulation of Watershed Management Plan

Phase 2:

- Conduct of tree growing
- Other watershed management works

(4) Non-wood forest products research project

Attention is drawn to non-wood forest products (NWFPs) recently, because it is expected to contribute to livelihood development and poverty reduction, and help avoid increased forest loss and degradation. Resin, elemi gum, bamboos, rattan, and buri raffia are among the NWFPs mainly produced in the

nursery. Experts are required to select a seedling source.
Transplant nursery: A nursery in which seedlings are transplanted for preparation for forest planting; experts are required to maintain the growth.

Philippines, and part of them is exported. Research on NWFPs is conducted at the Forest Products Research and Development Institute (FRPDI under DOI), and the Ecosystems Research and Development Bureau (ERDP under DENR).

However, no special activities on NWFPs are done in the ARMM, and therefore, it is required to conduct a research on NWFPs focusing on NWFPs' possibility in the ARMM as the first step for promotion. NWFPs can be incorporated into community-based forest management (CBFM).

The research may cover the following:

- Acceptability of NWFPs in view of social and natural conditions,
- Degree of NWFPs' contribution to livelihood development and forest protection,
- Proper kinds of NWFPs, if NWFPs are judged to be recommendable,
- Support measures by DENR, and
- Possibility to combine with CBFM

(5) Community-based forest management project*

A community-based forest management agreement (CBFMA) is an agreement between DENR and a registered people's organizations (PO) for a period of 25 years for renewal, and for another 25 years to provide tenurial security and incentives to develop, utilize, and manage specific portions of forest lands that is under Executive Order No. 263 and DENR Administrative Order No. 96-29. DENR-ARMM has 10 agreements, but only two are active, and no reports have been submitted for all the agreements. CBFMA holders sometimes abuse the harvesting activities without development. Therefore, the CBFMA holders performance shall be monitored and evaluated annually by the composite teams from the Provincial Environment and Natural Resources Office (PENRO), Community Environment and Natural Resources Office (CENRO), etc. to determine the compliance with the terms and conditions.

One more challenge is that no more national funds had been given to support the CBFM programs of ARMM after the creation of ARMM. Accordingly, fund is required to resume the CBFM in Bangsamoro, and possible donor support may be sought based on the results of the assessment and evaluation. The project is to implement a modified CBFM adopted to Bangsamoro, and start with the following:

- Evaluation of the 10 existing CBFMA holders performance,
- Formation of regular monitoring system, and
- Preparation of plan for resuming CBFM in Bangsamoro.

10.5.2 Marine resources management program

(1) Community based coastal resources management project*

In order to control and preserve natural resources at coastal areas properly, marine protected areas (MPAs) will be registered by the Bangsamoro government and LGUs. Basically, local communities manage the MPA activities with provincial and municipal LGUs to ensure proper monitoring and evaluation, and transparency and accountability. The project will train local community leaders and LGU officers for community-based costal resource management (CB-CRM) activities, and support local communities to make their CB-CRM regulations in participative ways.

The project will also introduce and develop some alternative activities for income generation to mitigate a fishing pressure at coastal areas by regular fishing activities. The eco-tourism program in MPAs is one of possible activities for income generation other than fishing. Therefore, the project will support to establish visitor centers of MPA areas, and organize eco-tour programs by local communities.

BFAR promotes the establishment of mariculture parks to develop marine culture activities as alternative income sources in collaboration with coastal resource management. Referring to the success cases of mariculture parks in Mindanao (Panabo in Davao del Norte or Balingasag in Misamis Oritenal), the project will apply the approach of mariculture park program to promote coastal resource management activities in coastal communities in the Bangsamoro region. Declaration of mariculture parks and their

management may be facilitated by a GIS.

Area plan of mariculture park at Panabo City in Davao del Norte; areas of aquaculture activities strictly controlled under the zoning plan

Sea cucumber ranching and propagation —one of promising resource management activities with income generation for local communities (Laguindingan, Misamis Oriental Province)

Watch hut in sea cucumber project at Laguindingan—community people regularly watch protected area of sea cucumber propagation.

Photo 10.13 Coastal Resource Management Programs in Other Areas of Mindanao

Local women group filleting milkfish as value-added product at local workshop

Local women groups also produce bottled marinated milkfish by utilizing small-size fish.

Local community association manages direct sales activities such as local seafood restaurant or store.

Photo 10.14 Income Generation Activities by Local Communities at Panabo Mariculture Park

(2) Marine surveillance reinforcement project

BFAR-ARMM currently conducts the training programs of illegal fishing control to organize local marine surveillance groups *Bantay Dagat* (sea patrol) at coastal municipalities in the Bangsamoro region. However, most of local Bantay Dagat groups have only small canoes with small power engines for regular monitoring at the municipal sea areas (from coastal line to 15 km). They cannot chase and catch illegal fishing boats in spite of their regular surveillance activities. In order to strengthen the monitoring activities by local communities, the project will equip local Bantay Dagat groups in coastal municipalities with speed boats to control illegal fishing activities in their municipal sea areas. In addition, the project will support to build Bantay Dagat offices with local fish market facilities in coastal municipalities.

Local Bantay Dagat office on the pier of a fishing port in Parang, Maguindanao (in need of renovation)

Fisheries Resource Management Unit Office in Banay-Banay, Davao Oriental; community members working for monitoring and surveillance activities in collaboration with municipal LGU.

Coastal community members at Banay-Banay regularly meet at the Fisheries Resource Management Office to discuss current and planned activities in fishing control and surveillance.

Photo 10.15 Marine Surveillance Activities in Mindanao

10.5.3 Renewable energy development program

(1) Mini hydro power development project*

For the development of hydropower resources, various surveys are underway in the main island of Mindanao, but that is not the case in the surrounding island provinces of Bangsamoro due to the security condition. However, according to hearing surveys, potential risk seems to be less in Tawi-Tawi than in other island provinces. In the Bangsamoro Development Agency (BDA) Transitional Development Plan (BDP I), the development of a mini-hydro power plant (MHPP) at Busay falls in Bohol and Bongao in Tawi-Tawi is designated as one of the priority projects. To grow out of dependency on diesel power generation and facilitate the introduction of renewable energy resources on the island, the development of a low-head hydro power plant in Tawi-Tawi is recommended. There are three candidate sites on the Malum River.

Additional hydropower resources are available in the mainland as well. For instance, waterfalls in the municipalities of Marugong and Kapatagon in Lanao del Sur and Matanog, Baria, and Buldon in Maguindanao may be tapped for mini hydro power generation. These sources can supply electricity to Camp Abubakar and its neighboring areas.

(2) Aquamarine farming with solar power pilot project

A plastic solar power panel, which is rust-resistant, lightweight, and easy-to-handle, is a product of advanced technology developed by a Japanese manufacturer. An innovative approach to aqua-farming is to apply the solar panel and a floating aerator. This system of aqua-farming is being tested by an ongoing experimental project in Dagpan of Pangasunan, financed by JICA. The developed solar panel is saline-resistant with a 10-year guarantee, light weight (2.2 kg per unit), and flexible in installation so that it can be used as a standalone, communal power generator.

Surrounded by sea and composed of large and small islands, the Bangsamoro region has a huge potential of realizing this business model. Furthermore, the utilization of solar power will contribute to the reduction of CO_2 emission, and the system is eco-friendly. In terms of environmental protection and business creation leading to industrial cluster development in Bangsamoro, this project is considered to be highly effective and promising.

(3) Biomass power generation project

A fairly large part of Bangsamoro especially in rural areas has not been electrified by the existing power grid and distribution lines. There is a program of village electrification by diesel generators to recharge LED lanterns' batteries and lead-acid batteries for lighting, communication, operating PCs, and other purposes; and by diesel engines to drive post-harvesting equipment. The fuel used for the diesel engines is straight vegetable oil (SVO) made from the beans of Jatropha (*Vernicia fordii* or *Aleurites fordil* Hemsley; *ooaburagiri* in Japan) that can be grown in the backyard or any marginal land suitable for growing such plants (e.g., at the roadside). Interested farmers may cultivate the plant along the perimeters of their farms.

The cost of procuring equipment to produce Jatropha seed oil (JSO) and of building a facility to house the equipment, conduct oil beans-related businesses and transactions, and provide battery-recharging service is estimated at about US$50,000. The facility may be called "power kiosk". A power kiosk may have a floor area of 54 m^2 (12 m x 4.5 m).

It is recommended that Jatropha farmers' associations be formed, which will be responsible for the construction, operation, and maintenance of power kiosks. Jatropha growers will become the consumers of power service provided by the power kiosks. The monthly income of these farmers is estimated at PHP 1,500, and the monthly battery-recharging service fee to be paid by the farmers to the power kiosk at PHP 500. Therefore, if the power kiosk system is operated and managed properly, the power service economy generated by it will be sustainable. Residents and the farmers who cultivate and supply oil beans purchase electricity at the kiosk, and the money circulates within their village or barangay. Thus, the power kiosk system will not only provide the local residents with job and income opportunities but also enhance the post-harvest processing that adds value to the local farm products.

The power kiosk is planned and designed to be operated in a sustainable manner by those interested farmers in each village or barangay. The financial return of one power kiosk is preliminarily estimated at 18% and the payback period at six years. If LGUs provide long-term loans to Jatropha farmers' organizations for operating and managing power kiosks, power kiosk projects will expand throughout Bangsamoro thereby bringing the convenience of electricity to many areas without power.

10.5.4 Small-scale irrigation program

(1) Small-scale irrigated crop intensification project*

Crop intensification means putting additional input to realize increased output per unit area of land. Irrigation is one means that crop intensification could be done by enhancing productivity per unit of land and allowing more than one crop per year (for temporary crops) increasing the annual production volume significantly. Coupled with improved agricultural water management practice, irrigation provides opportunities to cope with the impact of climatic variability. Specifically, small-scale irrigation is effective in fighting draughts.

Large-scale irrigation development proliferated in the 1970s with the establishment of the National Irrigation Administration (NIA), which constructed the national irrigation systems (larger than 1,000 ha irrigable areas) and communal irrigation systems (smaller than 1,000 ha irrigable areas) mostly by gravity type where water is diverted from the river and allowed to flow to the main canal and to the system of canals that distribute water to the farm lands. Those who are privileged to be in the service area and reached by water confirm the increase in production even if the land may not have attained the optimum level. The difference in output of irrigated and rain-fed paddies is about 1.0ton/ha. The problem with CISs and NISs in Bangsamoro and even all other regions of the Country is the large gap between irrigated and irrigable areas, which are about 50% in Bangsamoro and an average of 40% nationwide. About 65% of the service area in CISs and 44% in NISs are non-operational.

On the other hand, NIA and BSWM have been implementing projects on small-scale irrigation systems to take advantage of the potential of water resources in localities that could sustainably provide irrigation for small crop areas. NIA's small-scale irrigation projects (SSIPs) are generally larger than those of BSWM; about 50 ha- area for the former while minimum of 3 ha for the latter. NIA's SSIPs are generally of gravity type with diversion canal from the source of water or water pumped from the ground. BSWM's very small area development employs a wide range of technologies such as spring development, SFD, ram pump, solar pump, and wind pump.

Many countries around the world have also benefited farmers from successfully implemented small-scale irrigation projects. Generally, these projects' successes are accounted to effective communication with the farmer-users of the irrigation system. Consultations and involvement of the users themselves in the planning, design and implementation with reference to local information and indigenous knowledge are important. Local people, especially those that have lived in the locality for a long time can provide good baseline information validated by historical data, if any. Choice of technology should consider the capacity of the beneficiaries to operate equipment on their own. The need to introduce irrigation technology that is commensurate with the capacity of the final users of irrigation infrastructure needs to be considered properly. Initial investments, including credit facilities and irrigation water management training were found to be critical in many small-scale irrigation projects that succeeded.

The project will take on from the experiences of SSIP in other countries and those of NIA and BSWM. Implementing arrangements consist of DAF-Agricultural Engineering Division, BSWM and NIA as technical adviser, and the project will be initially implement with DAF, then transfer to DAF. The project should cover rice and non-rice crops such as sugarcane, cassava, vegetables.

The project will have the following components:

1) Trainings for technology providers and farmers as recipient of the irrigation system,
2) Financing for the acquisition of equipment and materials and production, and
3) Construction of facilities.

(2) Multipurpose small-scale irrigation development project

Small multipurpose reservoirs are a widely used form of infrastructure for the provision of water. They supply water for domestic use, livestock watering, and small-scale irrigation. Other beneficial uses include flood control and mitigate the impacts of drought and soil erosion. The reservoirs are hydrologically linked by the streams that have been dammed.[20]

The importance of small multipurpose reservoirs in the Philippines was given due recognition with the issuance of Presidential Administrative Order No. 408 on May 1976. This order established the Small Water Impounding Management Plan, which was intended to uplift the agricultural sector through reduction of damages brought about by frequent floods and draughts and the efficient direction of water resources to applications such as irrigation, fishery, etc. At its core, the plan was intended to relieve rural poverty and remedy the economic and social disparities between urban and rural areas.

Subsequently, the SWIM projects were developed under the Department of Public Works and Highways (DPWH) with the primary objective of flood control while benefitting from irrigation by the dammed water in reservoirs. The plan covered 187 locations and expected to benefit 13,000 ha. A portion of this plan was covered by Japan's official development assistance (ODA), under which 25 projects were implemented from 1989 to 1994. Impact assessments of Japan's ODA indicated that the projects had yielded substantial positive results such as reduction of flooding and increase in irrigated land. In many SWIPs, flooding almost ceased while the cropping intensity that had averaged 128% increased to 180%. Before the project, most of the areas were planted only in the rainy season and submerged areas only in the dry season.[21]

The proposed project will start from identification of water impoundments with potential, particularly those that have an irrigable area for any type of crop. The project will consist of several sub-projects, namely, small water and impounding projects (SWIMPs) coupled with irrigation, and other components depending on the situation and the condition of the project sites. It will be implemented through (1) a technical and economic feasibility study of the prioritized sub-projects primarily based on the potential to increase agricultural output, (2) detailed design, and (3) construction.

Each sub-project will involve close collaboration with the farmers as beneficiaries, who will organize an association of farmer beneficiaries (AFB). Once the project is completed, the irrigated land will be transferred, as a whole or in part, to the AFB. The project will be implemented through a project management office (PMO) under a steering committee guided by the Bangsamoro government chaired by the Secretary of DAF and vice-chaired by the Secretary of DPWH. The members of the committee will include one representative each from DENR and DBM. The national government will provide technical assistance through a team of national experts from the national-DPWH, NIA and BSWM. NIA and BSWM have been implementing participatory approaches to irrigation development, of which the project can take advantage.

10.5.5 Disaster risk reduction and management program

(1) Bangsamoro disaster risk reduction and management project

The Disaster Risk Reduction and Management (DRRM) Act of 2010 (RA 10121) has changed its DRRM policies from reactive to proactive ones. Accordingly, the ARMM Regional DRRM Plan 2012-2028 has been prepared to guide local authorities to effectively comply with the DRRM Act.

As one of the prioritized DRRM activities described in the National DRRM Plan and the Regional DRRM Plan, capacity development of the LGUs has strongly been emphasized. In order to implement the DRRM activities under the new approach, the needs for preparing the various plans as well as strengthening the capabilities of related organizations are rapidly increasing. However, the DRRM activities in ARMM have not been progressed well and still far behind the time schedule proposed in the Regional DRRM Plan. According to the Final Report of the Disaster Risk Reduction and

[20] Small Multipurpose Reservoir Ensemble Planning, CGIAR Program for Challenge Water & Food, February 2009. www.cgspace.cgiar.org
[21] Project Report: Small Water Impounding Management Project, March 2001, www.jica.go.jp

Management Capacity Enhancement Project, March 2015, JICA, the percentage of LGUs that have submitted their Local DRRM Plans is only 50% for ARMM as of December 2014, the lowest among the 16 regions, of which average was 90%.

Under the situation described above, the project aims to develop the DDRM capacity of Bangsamoro area, especially focusing on the following:

1) To establish local DRRM Councils and Offices and their operation centers;
2) To prepare/revise LDRRM Plans;
3) To establish well-organized disaster response operation;
4) To mainstream DRRM in regional, sector and local policies, and plans;
5) To establish sustainable training; and
6) To prepare necessary guidelines.

The success of the project greatly depends upon the positive participation of staff of OCD, the Bangsamoro government and LGUs. In order to attain the overall goal of the Bangsamoro DRRM, the Bangsamoro government is required to continue to accept the national DRRM policy. At the same time, introduction of innovative approach and elements such as risk transfer insurance should be examined that may fit conditions in Bangsamoro.

(2) Mindanao River Basin integrated river shed and flood management project*

The Mindanao River Basin (MRB) is the second largest river basin in the Philippines with the catchment area of 21,503 km^2 which drains into the Illana Bay through Central and Southern Mindanao. Major rivers within the basin include the Ala River, traversing the Ala Valley in the South, the Pulangi River with headwater from Bukidnon, the Ambal-Simuay River system originating from Lanao del Sur, and the Mindanao and Tamontaka Rivers in the lowest part of the river basin. There are three huge marshes (Ligawasan, Ebpanan and Libungan) in the central and lower parts of the basin, which act as natural storages to attenuate large flood flows. Before entering Cotabato City, the Mindanao River bifurcates into the Rio Grande de Mindanao and the Tamontaka River.

Due to the physiographic and climatic conditions, the basin has been prone to flooding and suffered from deforestation, soil erosion and siltation. Towns and cities along the Mindanao River have been constantly flooded during typhoons and heavy rain. Severe and constant floods ever caused disruption in social and economic activities, and inflicted damage to lives, livelihood, and properties reaching billions of pesos, especially at Cotabato City and surrounding areas. They also caused considerable reduction in the productivity of the forests, agricultural lands, and fisheries; availability of potable water; and returns from major investment in infrastructures, irrigation systems, among others.

The Mindanao River basin integrated river shed and flood management project aims to comprehensively deal with the flood problems in the Mindanao River basin, and utilizing the river basin in a more comprehensive way. It is composed of following eight sub-projects:

1) Comprehensive study on Mindanao basin flood control,
2) Improvement of Rio Grande de Mindanao and Tamontaka rivers flood control system,
3) Improvement of Buluan river flood control system,
4) Improvement of Pulangi river flood control system including repair of Tunggol bridge,
5) Improvement of Ambal-Simuay river flood control system,
6) Improvement of Ala river flood control system,
7) Enhancement of Mindanao river basin flood forecasting and warning system, and
8) Mindanao river basin urgent flood and sediment control project.

In preparing the Mindanao river basin flood control plan covering these rivers, a basin-wide point of view should be reflected, including effects of the marsh areas and sediment supply from the upstream. Also, utilization of land protected better by the flood control measures should be incorporated in the plan.

10.6 Institutional Measures

10.6.1 Agricultural finance expansion

With agriculture in Bangsamoro having historically been left out from the value chains established in other regions, farmers do not have sufficient knowledge in producing what is demanded by the market. Since their products do not meet the market standards in quality and quantity, farmers cannot fully capture market opportunities and thus their incomes remain low.

Most smallholders have also difficulties in receiving bank loans due to high collateral standards, complicated procedures and high interest rates set by the banks. The limited access to finance has hindered them from buying high-yield seedlings, fertilizers, cultivation tools as well as post-harvest and processing facilities. In order to cater to this situation, initiatives of intermediary organizations are needed to lower the costs of transaction and monitoring for the banks and provide farmers with technical assistance such as technical extension services and logistical assistance such as a collective supply of agricultural inputs and collective farming, harvesting, and selling activities to achieve the economies of scale. Although microfinance institutions (MFIs) operating in Bangsamoro have been reported to receive funds from government institutions to expand agricultural loans, its impact will be limited given the presence of very few ongoing programs that lead to an improvement of the linkages between farmers and financial institutions.

The Bangsamoro region is endowed with natural physical characteristics such as climate and land resources suitable for growing many types of crops. The popular saying that "you throw any seed, it will grow" certainly applies to the Bangsamoro region. However, the land potential should be harnessed to optimize the seeds it could return. The absence of suitable credit mechanism or the lack of access to such has continued to keep the region's crop productivity low. Farmers suffer from a vicious cycle of low income and low production from low productivity due to the absence of financing. On the other hand, banks do not prioritize agriculture production loans due to the risk attached to agriculture. Risk-averse banks are more apprehensive to lend to farmers in Bangsamoro due to poor repayment rates of government lending thru LBP. In view of these, the Bangsamoro agricultural financing needs an alternative credit mechanism.

The alternative credit mechanism would necessitate a fund from the Government to provide agriculture project financing and production loans to individual farmers and cooperative farms producing crops or livestock under an agriculture finance program of the Government for small farms and cooperatives. The main feature of this program is provision of low to zero cost loans for the borrowers and limited to small farmers and cooperatives whose members have smaller than 5.0 ha, which is the retention limit of landownership. The fund may be used for two types of loans as described below.

The financing program may be a joint undertaking of DA, LBP, and LGUS. DA will provide the loan fund, LBP will administer the fund, and LGUs will participate in monitoring the repayment of loans by the borrowers.

(1) Project financing

Loans may be granted to cooperatives for establishment or rehabilitation of commercial farms. Many ARBs under one CLOA formed cooperatives and operated the awarded farms as a single unit. Many of these cooperatives need financing to rehabilitate the previous commercial farms. The loans may be administered by LBP under a special lending program of the Government, which provides the loan fund.

(2) Production financing

This type of loan is designed for small producers for financing every crop production cycle. For example, a rice farmer can make a production loan to defray expenses for the whole cycle of production. He pays back the loan from the harvest and borrows again for the next crop cycle. This method of financing agriculture production is similar to production financing in the manufacturing sector. If this type of loan is available, small farmers are weaned from usurers and able to invest adequately in farming. Essentially, the cost of money for farmers should be lower than the market rates. Since the project is

production support of the Government, cost of money for the borrowers may cover transaction cost only. Thus, the fund is not expected to grow. Instead, it will have to be replenished to cover losses from repayment defaults and growing financing requirements. The Philippine Crop Insurance Corporation (PCIC) will provide insurance cover for production loans. This financing program may also be administered by LBP with cooperatives or farmers associations as conduits. In order to lessen defaults in repayment, the conduits should establish an effective mechanism for loan collection system.

(3) Land Bank of the Philippines

In concomitance with the expansion of agricultural finance as proposed, operational efficiency of the Land Bank of the Philippines (LBP) should be enhanced in providing loans to farmers and farmers' cooperatives. The project consists of two components. The first component is the support for the diversification of financial services that will help LBP improve its product design and loan distribution to smallholder farmers, and the second component is the support of extension services that will lead to the strengthening of farmers' linkages with actors in the value chains (financers, traders, investors, and relevant governmental agencies).

10.6.2 Diet improvement campaign in rural areas

People in Bangsamoro still maintain traditional food habits in the Philippines. Although cereals, starchy roots, and tubers are eaten abundantly, intake of fresh meat, egg, and regulating foods is still small. Such diet induces deceases due to vitamin A and B deficiency, such as beriberi and night blindness. For young children, it may cause developmental disorders. The 2010 food intake survey (FNRI) indicates that Bangsamoro inhabitants have the least amount of regulating foods in the Philippines; for instance, the daily intake of green leafy vegetables and vitamin C-rich food is 33 g and 15 g, respectively, on national average but 31 g and 7 g in Bangsamoro.

Table 10.13 shows the summary results of the 2010 FNRI survey. The values represent food intake per gram per day. As seen in the table, ARMM lags behind Mindanao and the Philippines as a whole in terms of body-building and regulating foods.

Table 10.13 Summary of Results of 2010 FNRI Survey

Food group	Philippines	Mindanao	ARMM
Energy-giving foods			
Cereals and cereal products	367	384	396
Starchy roots and tubers	17	19	29
Sugar and syrups	40	14	16
Fats and oils	15	11	9
Body-building foods			
Fish, meat and poultry	175	165	151
Eggs	14	11	7
Milk and milk products	7	26	19
Dried beans, nuts and seeds	9	7	5
Regulating foods			
Green leafy and yellow vegetables	33	40	31
Vitamin C-rich foods	15	12	7
Other fruits and vegetables	114	113	87
Miscellaneous	29	27	15

Source: National Nutrition Survey.

In July 2015, the ARMM Department of Health urged the Regional Nutrition Committee to emulate awareness programs and campaigns for better education of proper eating habits such as the national programs *Pinggang Pinoy* and *10 Kumainments* to address the emerging issues in nutrition in the Region. The Pinggang Pinoy program aims to educate the consumers on healthy balanced diet by providing recommendations on the proportion of food groups. Meanwhile, the 10 Kumainments provides guidelines on positive nutrition practices and encourage the adoption of healthy lifestyle among households.

Aside from educating the locals, it is also important to promote production of vegetables in the communities. For a start, awareness-raising of regulating foods will be ideal since some vegetables can be grown at home or in each community. Green leafy vegetables (e.g., *malunggay* and *pechay*) and vitamin C rich-crops (e.g., tomatoes and mangos) can be produced easily even in the backyard. The importance of proper food intake should be disseminated through awareness-raising activities, and also backyard production of such crops is extended by barangay health workers of the Department of Health.

Nutrition experts from international donors will train barangay health workers and disseminate proper and efficient dietary habit. The international donors may provide 3–5 nutrition experts, equip them with understanding of the present situation of food intake in the barangays, and extend practical training in backyard vegetable production. The dissemination of recipes for easy intake of these vegetables and fruits is also the role of such nutrition experts.

10.6.3 Strengthening of information functions of Bangsamoro government

This study found out that knowledge gap within the Bangsamoro, particularly among population in remote areas such as island provinces, is one of the obstacles for socio-political and even economic development. For example, the World Bank/WFP[22] report pointed out that a significant proportion of people were unaware or distrustful of news in their province and on Mindanao (about one third of the respondents of their survey reported being not at all or little informed about events in their province and the scores were worst in Maguindanao and Lanao del Sur, where 64% and 49% said they had no or little information).

Through the Bangsamoro TV and radio, the new Bangsamoro government will strengthen its capacity to disseminate information on important political process, as well as socio-economic knowledge and skills for wider population. Through interactive programs, it also can provide the Bangsamoro society an avenue for dialogue thereby contributing to social cohesion. This project aims to not only provide basic infrastructure for independent TV and radio broadcasting for Bangsamoro, but also build capacity to produce TV and radio programs to disseminate contents focusing on peace-building and socio-economic development through a series of trainings. Cooperative relationship between the Bangsamoro government and the people would be strengthened with LGUs as intermediaries.

10.6.4 Institutionalization of participatory planning and development

The Bangsamoro solidarity program (BSP) is a joint initiative by the Bangsamoro government, LGUs, communities, and civil society organizations. The democratically elected and inclusive (in terms of gender, socio-cultural groups, etc.) Bangsamoro Development Councils (BDC) will be established at barangay level under the supervision of municipal LGUs. The councils will identify the development projects such as community infrastructure and livelihood projects through consultative process, and receive bloc funds from the Bangsamoro government. The councils manage the projects through technical and managerial support from the LGUs and CSOs, thereby empowering communities as well as strengthening trust between the communities, LGUs and the government. The BSP projects may include small-scale infrastructure, livelihood, education, health, and so on.

10.6.5 Comprehensive SMEs support measures

There are about 50 SMEs registered in the Bangsamoro region but their operation is still vulnerable due to the lack of hard and soft resources needed for their business. Under the current situation of Bangsamoro, it is not effective to introduce SME development policy or projects according to the national standards because industrial structure as well as hard/soft resources surrounding SMEs are quite different in the region. For example, the 30% corporate tax applied to local companies elsewhere in the Philippines may be too high for businesses considering locating in Bangsamoro. Also, public financing for SMEs is actually limited to LBP. Lowering the corporate tax and relaxing the restriction

[22] Violent conflicts and displacement in Central Mindanao: Challenges for recovery and development, World Food Programme, World Bank, 2011

on financing may be effective and thus necessary.

RA 9501 Magna Carta for Micro, Small and Medium Enterprises (MSME) serves as the governing policy for MSME development in the ARMM. The Region also follows the national definitions for MSME categories. Based on the capitalization requirements, most of the Bangsamoro's enterprises will fit into micro to medium enterprises.

Under the law, DTI-ARMM is the lead agency responsible for the mobilization the necessary technological support and coordination mechanisms for promoting MSME and other entrepreneurial initiatives in the Region. One notable program of DTI-ARMM is the one town-one product (OTOP) initiative. Through this project, each city or municipality will have a focus on specific product or service on which they have significant competitiveness. The support of each LGU is paramount to make the OTOP successful. The OTOP becomes a support mechanism for MSMEs to manufacture and market their distinctive products

To cope with vulnerable policies and project surrounding SMEs in Bangsamoro, special time-bound policy is needed to enhance the SME development. Such special policy includes, but not limited to, the following:

1) Tax policy of SMEs;
2) Business incentives of financial institutions and money lenders;
3) Incentives of investors;
4) Labor code for local SME employees,
5) Policies identified by CARP, especially on ARBs and formed cooperatives; and
6) SME cultivation policy especially start-ups and business promotion.

The temporary legislation needs limited time-span so that the staged support by international donors will be necessary applying project-type technical assistance. A new SME support organization may be established to implement specific support measures to be formulated under the policy.

10.6.6 Halal industry promotion

Promotion of HACCP will also be necessary for the development of halal industry in Bangsamoro. Halal requires food safety elements, good manufacturing practices and good hygiene practices, which are already included in HACCP. The ARG has pursued the development of halal industry, and this is supported by the National Government with the identification of halal as a priority development strategy for the ARMM in the Philippine Development Plan.

Together with DAF-ARMM and DTI-ARMM, ARMM-RG had taken some steps to promote halal industry in the Region. Some of these are

1) Formation of a certification body for halal and creation of a certification standard;
2) Enactment into law of the Muslim Mindanao Autonomy Act No. 254 or the Halal Labeling Act of 2009;
3) Support services that can be tapped and further strengthened at all levels of the government, such as agricultural extension and technology transfer;
4) Creation of halal compliant trainings for crops and livestock, for which the modules are still to be developed; and
5) Implementation of pilot projects for halal feed and organic halal vegetables, among others, in some localities.

Recent development includes the creation of the Mindanao Halal Industry Task Force under the Mindanao Business Council and the creation of the Halal Certification and Accreditation Board in the private sector. In fact, the Framework Agreement on the Bangsamoro provides for the Bangsamoro Basic Law that enables the Bangsamoro government to accredit halal-certifying bodies in Bangsamoro. Specific promotion measures should be developed in line with this recent development by the task force for halal industry and Islamic financing created by the technical working group (TWG) for the present JICA Study.

10.6.7 Establishment of quality standards and criteria for export products

The food business operators should be encouraged to implement a hazard analysis and critical control points (HACCP)-based system for food safety assurance in their operations (RA 10611 in the Philippines). As of 2013, the companies coping with HACCP are 92 factories in the Philippines and none in Bangsamoro, but this is far behind from the number of Indonesia at 215 in 2009.

HACCP implementation and certification is hindered due to common issues/problems such as limited financial capability, lack of prerequisite program such as hygiene and sanitation in factories, limited HACCP knowledge and technical competence, management problems like lack of commitment, motivation and government infrastructure and support.

For example, quality control in sanitation has been a problem in the ARMM. Most of the food-related enterprises in the Region are family-based and use traditional methods. These enterprises may not know modern product preparation practices which are needed for compliance to HACCP. As these business do not comply with such internationally accepted standards, their scope of operations would also be limited to the domestic market.

HACCP implementation in Bangsamoro and their adjustment to EU and US legal regulations concerning food hygiene, safety and quality will give the producer/exporter stronger market orientation leading to product quality improvement. It will ensure consumer protection and increase in production profit.

The project aims to strengthen good manufacturing practice (GMP) and the capacity of HACCP through provision of classroom and on-the-job training to SME beneficiaries. Technical cooperation between the government (DTI) and the food industry to meet international standards for GMP and HACCP through an accreditation program will be promoted. This project also aims to increase food exports by providing buyers and interested parties with information on local processed food products that meet international requirements for quality and safety.

It is recommended that the project utilize resources available in academic sphere. A new faculty that teaches Shari'ah business and administration should be established at Mindanao State University (MSU) to introduce and lead Bangsamoro students to Islamic business. The faculty should cover such fields as basic Shari'ah law, halal food development, Islamic banking, and rituals. BDA tying up with CHED will advance this concept with the support of other Muslim organizations.

According to the interview with MSU in June 2015, only a few combat incidents have occurred on campus, and it is considered to be safe for donors to implement projects at the university. The aforementioned new faculty can be utilized to reeducate former members of armed groups as well.

10.6.8 Bangsamoro investment window

Land issues are an old perennial problem of conflict in Bangsamoro, and without establishing land development strategy, this issue will remain unsolved. BDA as the administrative body of Bangsamoro recognizes that deregulated permits on land development induce unorderly development, income disparities, and social conflicts.

Most large landowners (including *datu*s) are expecting to start business with investors and they are waiting for this opportunity. While small landowners, ARBs, and landless farmers are expecting to their participation in that project, which is initiated by datus and investors.

On the other hand, the potential investors to large-scale plantation from outside Bangsamoro want to tie up with a promising datu as his investment partner. They are keen to collect information on suitable partner but they are not familiar with practical customs on land management and endemic issues on their prospecting land.

The Bangsamoro investment window (BIW) supports realization of stakeholders' needs described above and strives to match investors, large and small landowners, and landless farmers in line with the regulation set by the administrator. The ideal functions of BIW are as follows:

1) Strategize the involvement of small landowners, ARBs, and landless farmers in the development;

2) Assess investment proposals to ensure suitability of investments to local conditions in Bangsamoro;
3) Provide investment information to potential investors both inside and outside Bangsamoro;
4) Serve as intermediator between large landowners to investors;
5) Monitor the progress of investment development and accumulate case studies; and
6) Disseminate successful cases.

Other than focusing on agriculture and agri-business, key investment drivers that can be integrated into the proposed BIW are the following:

- Competitiveness of land (including components of price and fertility) and labor (prevailing rate of the workers),
- Adaptation to the local cultural environment,
- Emphasis on shared goals and values, and
- Appreciation of similarities and interfaith dialogues.

The BIW is to be formed by collective agencies, each agency providing information regularly to the BIW center. In fact, the BIW can work for both local and foreign investors who are interested in doing business in Bangsamoro. Aside from gaining the support of local strongmen to be part of the BIW, the participation of the Land Registration Authority and other land related agencies will be needed to account for the possible tracts of land open for investment. Other agencies that are recommended to be involved in the proposed BIW as part of industry and investment promotion are agencies of ARG such as DTI, DAF, DOST, DILG, RBOI, and CDA. LGUs are expected to serve as intermediaries between the private sector investors and the Bangsamoro government with the BIW.

10.6.9 Development of regulatory framework of Islamic finance

(1) Current situation

There is only one entity operating under the concept of Islamic finance in the Philippines: Al-Amanah Bank, a government-owned Islamic bank. There is no legal framework supporting Islamic finance in the Philippines. The Al-Amanah Islamic Investment Bank had failed to be successful for the following reasons: 1) weak financial literacy and fundamentals among the people, 2) perceived high risk situation, 3) current state of economy, 4) lack of skills to handle Islamic banking, and 5) prevailing perception that Al-Amanah Islamic Investment Bank only served as the national government's instrument to appease the Muslims.

To attract market players to provide Islamic finance, there must be robust regulations supporting Islamic finance following the Sharia Law. Since the concept of Islamic finance in the Philippines is fairly new, regulators may not have the technical and practical capacity in drafting all the necessary regulations.

(2) Potential, development concept and project component

Technical assistance is necessary to support drafting of necessary regulations to support Islamic finance, in terms of banking and capital markets. Necessary expertise includes deep knowledge of Sharia Law, and establishment of Islamic finance in Malaysia. Capacity building is necessary for regulators to be adept with Islamic finance. For practicality, case or site studies with Malaysian regulators (i.e., Bank Negara Malaysia, Securities Commission) are to be undertaken.

(3) Institutional setup such as financial, implementation and coordination bodies

The following institutional setup is recommended:

1) For Islamic banking: Bangko Sentral ng Pilipinas (BSP) as regulators for all kinds of banks in the Philippines;
2) For non-bank Islamic finance activities (i.e., capital markets), Securities and Exchange Commission, as regulator for all capital markets products and participants; and
3) For implementation of necessary legislation, Congress and Senate of the Philippines (Bangsamoro Basic Law Committee, Banking and Intermediaries Committee).

10.6.10 Strengthening judicial system for land issues

In the Philippines, a Torrens title system[23] is used for landownership. Various government agencies are involved in landownership system such as LRA under DOJ, LMB and FMB under DENR, DAR, and NCIP. Having various government offices handling land tenure and ownership in the Philippines poses challenges in coordination and in organization of land information. Actual land practice shows that a special case of formal tenure is land held by agrarian reform communities (ARC) and/or resettlement areas. This is premised on proper land documentation. These lands showcase the exercise of *de facto* and *de jure* property rights by smallholders in the ARMM.

The banana plantation of La Frutera overcame the challenge of landownership issue by establishing a company that takes the responsibility of land leasing from small-scale farmers. This was the method that leveraged traditional culture and leadership of the datu system. However, there is no guarantee that the same method works in other areas. Agumil initially attempted the same approach in palm oil plantation. However, the problems emerged once the datu who was the partner passed away and his successor did not continue the contract. Agumil's strategy today is to have the individual farmer to join the cooperative that is a partner of Agumil.

Because of such background, the Bangsamoro government will need to handle each individual case of private investment plantation with flexibility. Each investment case needs to be handled separately/individually, considering and adjusting to the situation of business activity at the site of investment as well as demographics and cultural characteristics of the site.

The protection of property rights must extend beyond the attributes of land and resources. In order to ensure the safety/security of investment contracts, it is necessary to legislate a conflict/dispute resolution mechanism. Bangsamoro needs both official and unofficial judicial systems functioning. As official systems, judiciary at the barangay level, judiciary based on Shari'ah, and judiciary by civil court are needed. Methods of various conflict/dispute resolutions should be clearly articulated, stipulated and promulgated widely. Each judiciary system requires capabilities for proper enforcement.

10.6.11 Plantation development overseeing institution

Recently, some plantations have caused negative impact on the environment and society. For this, an institution to oversee the development and operation of plantations is necessary. First, the secretariat division will be formed as a permanent division. Then, a committee will be formed with members from local governments, the private sector, NGOs, residents' groups, etc.

The committee members will prepare guidelines for plantations in ARMM and oversee plantations from the preparation stage to the operation stage based on the guidelines. There are similar guidelines already used internationally, which are listed below, and they may be helpful in preparing the guidelines specific to Bangsamoro.

- The Palm Oil Innovations Group (POIG) Charter: http://poig.org/the-poig-charter/
- Roundtable on Sustainable Palm Oil (RSPO) Principles and Criteria: http://www.rspo.org/
- Transparency, compliance with applicable laws, commitment to long-term economic and financial viability, use of best practice, environment responsibility and conservation of natural resources, responsible consideration of employees, etc. are raised as principles in the RSPO Principles and Criteria.

The required cost for five years consists of

- Salary for secretariat staff: PHP 40,000/month x 60 months x 2 persons = PHP 4,800,000
- Remuneration for committee members: PHP 20,000/month x 60 months x 6 persons = PHP 7,200,000

[23] A Torrens system is a land registration system in which the government is the keeper of all land and title records. The land title serves as a certificate of full, indefeasible, and valid ownership.

10.7 Peace-building Support Strategy and Measures

10.7.1 Peace-building support strategy

The Bangsamoro development plan should contribute to building peace and preventing further conflicts. Projects and institutional measures proposed in this chapter have been formulated under the development vision presented in the sub-section 8.3.1 and the development objectives established in the sub-section 8.4.2, reflecting concerns summarized in Chapter 7. Peace-building Perspective of Bangsamoro Development. Also in line with the basic strategy with four components presented in the sub-section 8.4.2, strategy for peace-building is presented in this sub-section and selected projects contributing to peace building are highlighted in the sub-section 10.7.2.

Focusing particularly on the thematic areas assigned to JICA for the BDP, two-pronged strategy will be effective for peace-building through the Bangsamoro development with the following:

1) Improvement of access to remote rural areas and conflict affected areas and
2) Widening opportunities for various livelihood and economic activities for those affected by conflicts.

These strategy components should be pursued in an integrated way for cost-effectiveness by promoting the economic corridor development and the industrial cluster development. The economic corridor development will be supported by the upgrading of artery road network, which is a prerequisite condition in Bangsamoro for access improvement to rural areas not linked to national or even provincial roads. It will be realized by the development of viable agricultural and agro-industry activities along the major artery roads, and provide a large number of employment opportunities.

The industrial cluster development based on primary products will link livelihood activities by the poor through indigenous industries to export industries competitive in the global market. This way, livelihood activities can be sustainable and given a better chance to be developed into viable economic activities together with indigenous industries linked to export industries. An economic corridor links between primary production areas, locations of agro-processing plants and export base such as port and airport facilities involved in an industrial cluster. Thus, the industrial cluster is established along the economic corridor.

In pursuing the two-pronged strategy by economic corridor development and industrial cluster development, good governance holds a key. As expressed in the Bangsamoro vision in the sub-section 8.3.1 and the development objectives in the sub-section 8.4.2, good governance is realized by responsive and transparent governance system with people's participation. Specific measures to realize good governance are proposed in the section 10.6 as highlighted in the sub-section 10.7.3.

10.7.2 Projects to facilitate peace-building

Many projects proposed under the four initiatives of the BDP will facilitate peace-building by providing improved links for conflict-affected areas to the artery road network and expanding and diversifying livelihood and economic activities for conflict affected people under the two-pronged strategy. In particular, the anchor projects have been designated to benefit focusing comparatively more on small farmers, subsistence fisher folks as well as those affected by conflicts including former combatants, IDPs and IPs.

The Bangsamoro economic corridor development and industrial clusters development are proposed in line with the two-pronged strategy together with the artery road network development. The abaca and coco products industrial clusters will benefit livelihood activities of the poor segment of the Bangsamoro society and former combatants, and also support the return of some IDPs. The Polloc port upgrading and the Cotabato airport development will provide more effective outlets for products of the industrial clusters. The greater Cotabato City urban infrastructure development and the Jolo and Bongao urban functions upgrading will strengthen links between the mainland and island provinces and between urban and rural areas. Associated with these projects, the Polloc port and ecozone development and the special employment zone development will provide locations for export industries linked to indigenous industries and livelihood activities involved in the industrial clusters.

The agricultural cooperatives empowerment project and the communal irrigation support project are intended to benefit small farmers by technical extension, financing, infrastructure and other support. To support the expansion and diversification of livelihood and economic activities, integrated farming will be promoted with emphasis on goat and poultry and mixed farming will be promoted combining two or more field crops to enhance productivity and farm income effectively. Some of these activities will be promoted as halal industry. The open market establishment project will allow large agri-business companies locating in Bangsamoro to provide local market facilities as part of their corporate social responsibility (CSR). This will orient small farmers to undertake market-oriented production.

Cold storages and ice making plants are installed at major fish ports to support small fisher folks to increase the distribution capacity of their fresh and frozen fish. The marine culture development project will help to diversify livelihood opportunities for small fisher folks linked economically to producers and exporters of high value aqua-products.

Community-based resource management will be promoted to ensure rich natural resources in Bangsamoro will be managed and utilized by, and for the benefit of local people. The community-based forest management will entrust the management to local communities, while allowing sustainable use of forest resources. The community-based coastal resource management will support local .generating activities to mitigate a fishing pressure, including ecotourism by establishing marine culture parks in marine protected areas.

10.7.3 Institutional measures to support peace-building

In addition to these strategy and projects, institutional measures will support the peace-building. In particular, the following institutional measures proposed in Section 10.6 will contribute to building peace through empowering local people in remote rural areas and conflict affected areas:

1) Agricultural finance expansion;
2) Diet improvement campaign in rural areas;
3) Facilitation of communications between the Bangsamoro government, LGUs, and local people; and
4) Participatory development planning and implementation.

The following institutional measures will support livelihood development and peace-building indirectly by strengthening indigenous industries:

5) Comprehensive SMEs support measures and
6) Halal industry promotion.

To ensure the successful industrial cluster development, the following institutional measure is essential to establish viable export industries with value-added products:

7) Establishment of quality standards and criteria for export products and
8) Bangsamoro investment window.

The following institutional measures support all the economic activities constituting industrial clusters along economic corridors:

9) Development of regulatory framework of Islamic finance and
10) Strengthening judicial system for land issues.

Finally, the following measure will ensure sound relationships between all the players in any industrial cluster:

11) Institution that oversees plantation development.

10.8 Bangsamoro Development Scenario

Actions to be taken in steps to implement the BDP and changes to be made over time toward the realization of the Bangsamoro vision are outlined as the Bangsamoro development scenario. For the purpose, the planning period of the BDP is divided broadly in three phases. No timeline will be shown

at this time, given the uncertainties surrounding the political process to establish the Bangsamoro Transition Authority. An implementation schedule of all the proposed projects is shown in Figure 10.19 in an indicative way without specifying timelines.

Figure 10.19 Indicative Phased Implementation Schedule

10.8.1 Phase 1

(1) Overview

This is a preparatory phase of the BDP implementation. It is imperative that the Bangsamoro initiative be well known throughout Bangsamoro and beyond to ensure wide support. As the first step, BDA should continue its effort to disseminate the BDP to all the LGUs and other stakeholders. As part of the effort, focus group discussions should be conducted with key stakeholders including former combatants, IDPs and other conflict affected people as well as IPs to understand better the development needs at the grass root level and to explain how the ongoing Bangsamoro initiative with the BDP will respond to them.

Based on that, proposed projects in the BDP should be tailor made to fit specific needs of different stakeholders in different areas. Such extensive consultations should be seen as the first step to institutionalize the participatory development planning and implementation.

The Broad-based Inclusive Development is the main initiative during this phase, but elements of the other initiatives should also be implemented. During this phase, wide understanding on the importance of resolving land issues should be cultivated among the top management of MILF, LGUs and residents, and principle of land management in Bangsamoro should be established through clarification of land issues specific to Bangsamoro.

(2) Socio-economy

Some proposed projects may be implemented immediately. In addition to water and power supply improvement by urgent measures, artery roads should be improved steadily covering priority sections of national and provincial roads. This is a prerequisite to improving access to some remote rural areas and conflict affected areas, as the artery road network in Bangsamoro at present is incomplete with many missing links.

Existing livelihood and economic activities should continue to be supported with technical extension, finance, infrastructure and other support to enhance productivity and farm income for the majority of Bangsamoro people. At the same time, support of selected new livelihood and economic activities should be initiated early. Extending the ongoing support for industrial cluster development, selected industrial clusters should be proceeded to the next stage of product and market development. Abaca and coconut-based industrial clusters are natural choice. During this preparatory phase, promotion measures for halal industry and Islamic finance should be formulated extending the activities of the TWG for the present JICA Study.

These existing and new activities will encourage return and re-settlement of IDPs by ensuring livelihood and income opportunities. Thus, the Bangsamoro population will start to grow at higher rates than it has in the recent past.

(3) Spatial development

Physical integration of Bangsamoro should proceed steadily as the artery road network is improved as mentioned above. While the preparatory works are undertaken to develop the Bangsamoro economy, Bangsamoro should start preparation for rapid urbanization expected in coming decades. Cotabato City, the expected Bangsamoro capital city, is already developing rapidly, causing traffic problems and expansion of its urbanized area. Planning for urban development of the Cotabato City metropolitan area should start in the immediate future as proposed, covering related urban and logistic infrastructure.

Connectivity between the mainland provinces and the island provinces should start to be strengthened. Improvement of port and airport facilities proposed in the island provinces should be implemented on a priority base. Water and power supply on the island provinces should also be undertaken early by using local water sources and mini hydro power. Economic links will also be strengthened by early development of the abaca and coconut industrial clusters.

10.8.2 Phase 2

(1) Overview

As the legal and institutional arrangements for the Bangsamoro autonomy are formally made, the implementation of the BDP should be jump-started and sustained by concerted efforts of all the stakeholders supported by international partners. The region's autonomy should be based on the participatory development planning and implementation to be institutionalized from bottom-up with barangay councils, through LGUs to the Bangsamoro government. As part of such institution, community-based resource management should be introduced first as pilot projects for forest and coastal resources under the Enhanced Resources Management.

During this phase, the Concerted Pump Prime provides momentum for jump starting, and strategic infrastructure and urban development should be undertaken including steady improvement of the artery road network. At the same time, the Alternative Socio-economy Promotion should be expanded on the base of local people and community empowered during the first phase. Related to the land issues, a new institution that may be called the Bangsamoro Land Management Office (BLMO) should be established.

(2) Socio-economy

The new livelihood and economic activities initiated during the first phase should be further developed and additional activities should be introduced. The abaca and coco products industrial clusters will develop in full scale, supported by development partners providing R&D and marketing support for new products including export products. Other industrial clusters will be started with improvement of respective primary products such as coffee, cacao and rubber.

The integrated and mixed farming will be more diversified by developing viable combinations fitted to different localities throughout Bangsamoro. The R&D activities at the existing institutes should be strengthened to ensure development and supply of seed and planting materials fitted to different local conditions. Aquaculture development will be actively undertaken including marine culture for high value products. Fresh water aquaculture will also develop, possibly integrated with crop cultivation and poultry.

The promotion measures for halal industry and Islamic finance formulated during the first phase should be implemented to support particularly the new livelihood and economic activities such as goat based integrated farming and mixed farming by small holders.

(3) Spatial development

With the steady improvement of the artery road network continued from the first phase, access to remote rural areas and conflict affected areas will be significantly improved. Port and airport facilities in the island provinces will be further improved to strengthen links with the mainland as well as within each province. The upgrading of the Polloc port and ecozone will be started, and ecozones in the island provinces will start to be developed under the concept of special employment zone. The port and ecozone development in the island provinces should be planned to expand trade with the BIMP-EAGA countries.

10.8.3 Phase 3

(1) Overview

This phase represents the continuation and extension of Phase 2 development under the Bangsamoro transition authority, and the BDP is expected to be implemented in full steam by the new Bangsamoro autonomous government. The new government should be equipped with strong information functions supported by ICT facilities for effective communications between the people, LGUs and the Bangsamoro government to realize a bottom up development planning and implementation.

The Alternative Socio-economy Promotion is the main initiative during this phase, while the Enhanced

Resources Management will continue to be implemented. Private sector activities will be the main driving force for the Bangsamoro development under the guidance of the new government and the community-based resources management, although continued major infrastructure development will be supported by development partners.

(2) Socio-economy

The livelihood and economic activities introduced and developed during the previous phases will ensure employment with adequate income for small farmers, subsistent fisher folks, IPs and former combatants and IDPs throughout Bangsamoro. These activities will be sustainable by links with indigenous and export industries constituting industrial clusters developing along economic corridors. Most export industries and some indigenous industries will establish in the Polloc port and ecozone and the special employment zones in the island provinces linked to BIMP-EAGA and other countries.

Major agri-businesses will continue to establish in partnership with local landowners and investors facilitated by LGUs under the guidance of the new government. They will provide not only a large number of employment opportunities for local people but also high value-added processed goods produced by advanced technology for export markets. Together with products of halal industry, Bangsamoro will establish gradually international fame for selected products.

(3) Spatial development

Bangsamoro will establish strong economic and physical links with the BIMP-EAGA countries as well as the neighboring regions of Mindanao. Regular air and maritime transport services will be established with the neighboring countries linked also with major cities in Mindanao. The mainland and island provinces will be linked by speed boats for passenger and cargoes. The urban hierarchy will be well established within Bangsamoro for effective delivery of urban and social services, and a city network will develop in steps linked first with major urban centers in Mindanao extended to cities in the neighboring countries as well. Bangsamoro cities will be equipped with some higher order urban functions complementary with other cities in the network.